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UNDERGRADUATE
CURRICULUM DEVELOPMENT AND CHANGE
POLICIES AND PROCEDURES MANUAL

OFFICE OF ACADEMIC AFFAIRS

2015

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INTRODUCTION

The purpose of the *Undergraduate Curriculum Development and Change Policies and Procedures Manual* is to provide information related to the development, revision, and discontinuation of undergraduate curricula at Old Dominion University. It is intended for use by faculty, department/school chairs, deans, and other academic administrators who are involved in the development and approval of new and revised curricula or the discontinuation of programs.

The manual includes sections on program- and course-related actions as well as other curricular components such as majors, minors, and certificates. The individual sections outline the required actions in order to implement the various types of curriculum changes.

Appendices cover the relevant Old Dominion University and SCHEV policies, procedures, and forms that govern new academic programs and other curricular changes.

Questions about undergraduate policies and procedures may be directed to the Assistant Vice President for Undergraduate Studies.

PROGRAM-RELATED ACTIONS

NEW AND SPIN-OFF DEGREE PROGRAM PROPOSALS

The following describes the process for developing a proposal for new and spin-off degree programs, including the internal and external steps for approval. They involve extensive reviews of a detailed program proposal. A new program is one that includes curriculum currently not offered by the institution. A spin-off program expands curriculum offered as part of an existing program or a minor into a stand-alone program. Internally, proposals must be approved at all levels including the Board of Visitors. Externally, the State Council of Higher Education for Virginia (SCHEV) must approve a new degree program [see Appendix H(1) & (2)]. The Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) approves new programs when a substantive change is proposed (http://www.sacscoc.org/pdf/081705/Substantive%20Change%20policy.pdf).

A. Program Proposal Development—Exploration

1. The concept for a new program or spin-off program originates at the department/school level, usually generated by an individual faculty member or a small group of faculty—the program developers.

2. The concept—formulated into a brief written preliminary proposal that describes the program, including a rationale and course requirements—is discussed among the program developers, the department/school chair and the dean. Together, they determine whether (a) the plan is viable, (b) there is support for developing the concept further, and (c) there are adequate resources for implementation.

3. If a positive response is received at the department/school and college levels, the program concept is presented to the Vice Provost for Academic Affairs.

   a. The Vice Provost evaluates the concept to: develop an understanding of the program being proposed; determine whether it fits within the scope of the University's mission, goals, and strategic plan; define its unique characteristics; identify similar programs at other Virginia institutions; explore alternative ways of implementing the curriculum; and test the program concept in terms of student/employer demand and resource implications.

   b. The Special Assistant to the Vice Provost informally consults with SCHEV staff members for guidance about the program concept.

4. Based on the criteria noted in item 3.a. (above), as well as on guidance from SCHEV, the Vice Provost will make a recommendation to the Provost as to whether a comprehensive program proposal should be approved for development. The Provost may consult with the Vice Provost and Dean (and President, if needed) about the viability of the program concept to ascertain their interest in moving forward with a proposal to be developed in accordance with SCHEV guidelines.

5. If program viability appears inadequate, the Provost informs the Vice Provost that the plan must be abandoned or reformulated. The Vice Provost then informs the developers and the dean of the need to abandon or alter the plan.

6. If program viability is strong, the Provost authorizes a comprehensive program proposal to be

prepared for SCHEV. The Vice Provost works directly with the program developers and coordinates the formal proposal development process described below.

Note: Proposals for a new program should be included in department/school and college planning and operating budget proposals.

B. Program Proposal Development—Formal Documentation

1. The Vice Provost for Academic Affairs or his/her designee works directly with the program developers on drafting the formal program proposal, completing the internal and external review process, submitting documentation to SCHEV and SACS/COC (if the latter is required), and implementing the program. In addition to oversight and coordination, the Vice Provost is responsible for the following actions.

   a. Thoroughly briefing the program developers from the department/school and/or college on SCHEV's approval process and requirements.

   b. Creating a program proposal development timetable that identifies the major steps in the process as well as deadlines for their completion.

   c. Ensuring that meetings take place between program developers and:

      i. Institutional Research—for assistance in preparing data on the enrollment and degree productivity of similar programs offered by other institutions in Virginia and in projecting enrollment data for the new program;
      ii. Institutional Assessment—for assistance with assessment planning, curriculum mapping and other assessment efforts related to the new program
      iii. University Librarian—to determine the adequacy of current library holdings to support the proposed need to purchase additional materials
      iv. Distance Learning—to ascertain appropriate technologies that may be needed in delivery of the program.

2. The program developers draft the proposal according to SCHEV format guidelines and requirements. During this time they work closely with the Vice Provost and with the Institutional Research team. This part of the process usually involves the review of one or more drafts of the proposal. The program developers must also address the items listed below as part of the proposal development process.

   a. All program proposals must include a resource needs section to be prepared following the SCHEV format. The program developers should consult with their department/school chair and dean about resources required for program implementation. They may also want to consult with the Associate Vice President for Academic Affairs on resource questions.

   b. Resource needs should be included in annual operating or biennial budget requests from the department/school and college for the appropriate fiscal year.

3. When the Vice Provost is satisfied that the draft program proposal is complete, a copy is provided to the Provost for review. Revisions are made to the draft proposal as necessary, and the proposal is submitted through the review and approval processes described below.

C. Internal Program Proposal Review and Approval

1. The faculty of the originating department/school or its designated committee finalizes the completed program proposal, incorporates input from external reviewers, and makes a recommendation on its approval to the department/school chair.

   Note: Proposals for interdisciplinary programs must be reviewed and a recommendation made by all departments/schools and colleges involved.

2. The department/school chair reviews the proposal and makes a recommendation on approval to the college undergraduate curriculum committee.

3. The curriculum committee reviews the program proposal and makes recommendation on approval to the dean.

4. The dean reviews the proposal, taking into consideration the recommendations of the department/school faculty, department/school chair, and college curriculum committee, and makes a recommendation to the Provost.

   Note: The dean ensures that the resource requirements identified in the program proposal are justified and outlines a plan for obtaining such resources, including operating budget requests or biennial budget initiatives if necessary.

5. The Provost transmits the program proposal to the Chair of the Faculty Senate for review and recommendation by the appropriate committee.

6. The Faculty Senate committee's review may include meetings with the program developer(s), department/school chair, and dean, as needed, to discuss the proposal and any concerns that may arise. The committee submits a recommendation on the program proposal to the full Faculty Senate for review.

7. The Faculty Senate deliberates the committee's guidance and makes a recommendation on the program proposal; this recommendation is subsequently submitted to the Provost and President.

8. The Provost reviews the program proposal and prior recommendations, with input, as appropriate, from the Provost's Council and the senior Academic Affairs staff. The Provost then makes a recommendation on implementation to the President.

9. The President reviews and approves the proposal, followed by its submission to the Academic and Research Advancement Committee of the Board of Visitors for review and recommendation to the full Board.

10. The Board of Visitors reviews the Committee's recommendation and takes a formal action on the approval of the program proposal.

11. Following the Board's approval, the Vice Provost or his/her designee will prepare the final program proposal for submission to the State Council of Higher Education for Virginia (SCHEV). The Vice Provost also prepares a draft letter for the Provost that will accompany the program proposal. The letter must describe the institution's commitment to the program,

explain how it will fit into the University's strategic plan, and describe funding plans including reallocation or other resource actions.

Note: Communication between SCHEV and ODU generally runs through the Special Assistant to the Vice Provost for Academic Affairs; if the Special Assistant is unavailable, the Vice Provost or another member of the Vice Provost's team may take part in this communication.

D. External Program Review and Approval: SCHEV

1. The Vice Provost/designee has apprised staff at the State Council of Higher Education for Virginia about the program. SCHEV generally requires two to six months of lead time for its processes. The SCHEV staff reviews the program proposal, communicating with the Vice Provost and/or Provost on items requiring clarification and/or additional information. The staff then submits its recommendation on approval to SCHEV's Academic Planning Committee for inclusion on the agenda of an upcoming meeting.

2. SCHEV staff notifies other state institutions about the new program proposal to determine if there are any objections or concerns related to possible duplication of program content in the state.

3. The SCHEV Academic Affairs Committee meets to review the program proposal. At this meeting, the program developers, Dean, and Vice Provost are available to answer questions and/or provide clarification related to the program.

4. The Academic Affairs Committee makes a recommendation to the full SCHEV board for approval; the recommendation may also include stipulations related to the program's implementation.

5. SCHEV formally notifies ODU of its recommendation, and the Provost forwards the notification to the Vice Provost, Dean, Chair, and program developers.

E. External Program Approval: SACSCOC

Generally, new and spin-off degree programs are not submitted to SACSCOC for approval. Those that meet the guidelines for Substantive Change at SACSCOC Accredited Institutions (http://www.sacscoc.org/pdf/081705/Substantive%20Change%20policy.pdf) may be subject to notification and/or approval. In those cases, the President or designee (SACSCOC Liaison) must notify the SACSCOC President about the new degree program at least six months prior to the planned implementation date. Copies of the same documentation submitted to SCHEV, along with SCHEV's approval letter, are submitted to SACSCOC along with the letter of notification. If SACSCOC requires notification or approval, the steps in this process include the following:

1. SACSCOC determines whether a prospectus is necessary and notifies the University accordingly; such a document more fully describes the new degree program, and may be required if the program has unique characteristics and/or is intended for distance learning deliveries.

2. If a prospectus is required, it is prepared by the program developers, working with the Vice Provost and submitted not later than six months prior to the program's scheduled implementation date. Other University offices may also be involved in the development of a prospectus, such as Distance Learning, depending on the nature and scope of the program.

3. SACSCOC reviews the program materials and prospectus (if required) and notifies the University about its decision to approve the program.

F. Implementation

1. Once the University has obtained internal and external approvals, courses and program information are entered into CourseLeaf for inclusion in the Undergraduate Catalog and Banner (See Appendices E and F). Subsequently, preparations for program implementation begin, and may include the following:

   a. Student recruitment plan
   b. Course scheduling
   c. Faculty recruitment and/or assignments
   d. Preparation of program information for the *Undergraduate Catalog*, web site, brochures, and any other communication materials
   e. Budget requests, as necessary
   f. Addressing of stipulations set forth by SCHEV and/or SACSCOC, if included in approvals

2. The program is launched.

Program Proposal Development/Approval Recommended Timetable

July	Identification of program proposal developer; needs assessment completed Identification of external reviewers to examine the proposal
August	Presentation of initial proposal/concept to Vice Provost Departmental curriculum meetings
September	Internal review at college level (curriculum committee)
October	Meeting with Vice Provost on revised proposal Presentation of proposal to Provost; forwarding of proposal to Faculty Senate
November	Review and recommendation by Provost's Council
December	BOV approval Submission of proposal to SCHEV
March	SCHEV approval
August	Program implementation

DEGREE PROGRAM MODIFICATION

The University undergoes an established process for making changes to previously-approved degree programs. Such revisions frequently involve a change in the program title, degree designation (such as B.A. to B.S.), or the CIP (Classification of Instructional Programs) code. This process is used by SCHEV to make relatively minor—as opposed to substantive—revisions to existing programs. SCHEV must approve requests for program revisions using the procedures, format, and guidelines contained in Appendix H(3) for review and approval. Steps in the process at ODU are as follows:

1. Discussions about the proposed program revision(s) take place among the department/school Chair, the Dean, and the Vice Provost for Academic Affairs prior to the development of a formal proposal that details the changes.

2. When the Chair, Dean and Vice Provost reach consensus about the revision(s), the Chair, in collaboration with the Vice Provost, prepares a proposal with descriptions/justifications. The proposal—following SCHEV formatting—covers each of the items below:

   a. A description of the change being proposed
   b. The rationale for change
   c. Plans for assessment of student learning and performance

3. If the proposed revisions involve more than a change in the degree designation or program title, the proposal must also provide details about the following items:

   a. The new curriculum
   b. The transition of current students to the revised program
   c. Information related to any potential impact on the program's specialized accreditation

4. The chair forwards the proposal to the department/school undergraduate curriculum committee; the committee notifies the chair of its recommendations, which are subsequently forwarded to the college undergraduate curriculum committee.

5. The college curriculum committee reviews the proposal and makes a recommendation to the Chair and the Dean.

6. The Dean reviews the proposal and submits a recommendation on the proposed revision(s) to the Vice Provost for Academic Affairs.

7. The Vice Provost consults with the Provost and other administrators or faculty, as appropriate, and makes a recommendation on implementation to the Provost.

8. The Provost reviews the proposal and makes the final internal decision on the implementation of the proposed program revision(s).

9. The Vice Provost submits the approved proposal for program revision(s) to SCHEV for review and approval.

10. When SCHEV approves the proposal (potentially after a review period of 2-3 months), revisions are implemented during the term and year indicated in the proposal. Information about the revised program will be included in the next *Undergraduate Catalog* published by the University, as entered by the department (see Appendix B).

11. Depending on the program revision, it may be necessary to inform SACSCOC of the change(s) in accordance with the provisions of the *Substantive Change Policy for SACSCOC Accredited Institutions (http://www.sacscoc.org/pdf/081705/Substantive%20Change%20policy.pdf).* If requested, the Vice Provost submits a prospectus to SACSCOC.

PROGRAM MERGER

The following section describes the process for merging two or more existing academic degree programs into a single academic degree program. The process is similar to the one used for the development and approval of a new degree program. The format for the formal proposal requires less information and is less complex than the one prepared for a new program. A copy of the SCHEV format for merging academic programs is included in Appendix H(4).

A. Merger Proposal Development—Exploration

1. The dean(s) of the college(s) and chair(s) of the department(s)/school(s) interested in program merger discuss the proposal to do so. Each ensures, respectively, that the college(s) and unit(s) identify plans for such a merger.

2. The dean(s) and chair(s) present the proposal to the Vice Provost for Academic Affairs. The purpose of the presentation is for the Vice Provost to develop an understanding of the merger being proposed, critique the proposal, determine whether it fits within the scope of the University's mission, goals, and strategic plan, define any unique characteristics, consider alternative ways of implementing the curriculum, and explore the program idea in terms of student/employer demand and resource implications.

3. The Vice Provost provides the dean(s) and chair(s) a copy of SCHEV's policies and procedures for program merger. The Vice Provost simultaneously informs the Provost of the exploratory stage in this merger proposal.

4. The Vice Provost consults with SCHEV staff members about the merger proposal, and requests guidance on the process.

5. The Vice Provost requests that the staff in Institutional Research prepare data on the enrollment and degree productivity of programs proposed for merger and to identify similar programs offered by other institutions in Virginia; in addition, the staff members in Institutional Research are asked to prepare preliminary enrollment projection data for the merger.

6. The Vice Provost makes a recommendation to the Provost on merger viability and implementation planning. The discussion with the Provost also includes alternative approaches to offer the curriculum and resource implications of the merger.

7. The Provost consults with the dean and President, as needed, about the merger proposal, including resources implications, viability, and competitive programs in the Commonwealth.

B. Merger Proposal Development—Formal Documentation

1. When the concept is approved internally, the Vice Provost works directly with the proposal developers, initially providing specific information and forms on proposal submission for

SCHEV and (if necessary) SACSCOC. The Vice Provost also provides copies of the SCHEV policies and procedures guidelines to the program developers.

2. The program developers draft the proposal according to SCHEV guidelines. During this time they work closely with the Vice Provost and the Office of Assessment. This part of the process usually involves the review of one or more drafts.

3. When the Vice Provost is satisfied that the draft program merger proposal is complete, a copy is provided to the Provost for review and comment. Revisions are made to the draft proposal as necessary.

C. Internal Merger Proposal Review and Approval

1. The complete program merger proposal is reviewed by the faculty of the originating department/school(s) or its designated committee(s), and a recommendation on its approval is made to the chair(s).

2. The chair(s) review the proposal and make a recommendation to the dean(s).

3. The dean(s) submit the proposal to the appropriate committee of the college faculty governance structure(s), usually a curriculum committee, for a review and recommendation to the dean(s), through its usual process. Simultaneously, the dean(s) ensure that resource requirements for the merger are identified and justified in the department / school budget proposal and included in the college proposal.

4. The dean(s) review the proposal, taking into consideration any required resources for the merger, along with recommendations of the department/school faculty, chair(s), and college committee(s), and make a recommendation to the Provost.

5. The Provost transmits the merger proposal to the Chair of the Faculty Senate for review and recommendation by the appropriate committee(s).

6. The Faculty Senate committee reviews the proposal with the faculty developer(s), chair(s), and dean(s), as needed, and subsequently submits its recommendation on the merger to the full Faculty Senate.

7. The Faculty Senate reviews the committee's recommendation and makes a recommendation on the program merger to the Chair of the Faculty Senate.

8. The Faculty Senate Chair forwards the Faculty Senate's recommendation on the merger proposal to the Provost and President.

9. The Provost reviews the merger proposal and prior recommendations with his/her senior staff and Provost's Council, and makes a recommendation to the President.

10. The President receives recommendations and approves the program merger proposal.

11. The Provost submits the merger proposal to the Board of Visitors' Academic and Research

Advancement Committee for review and recommendation to the full Board.

12. The Academic and Research Advancement Committee reviews the program merger proposal and makes a recommendation to the Board of Visitors.

13. The Board of Visitors reviews the Committee's recommendations and takes action on the approval of the program merger proposal.

14. Following the Board's approval, the required copies of the final program proposal are prepared by the Vice Provost for Academic Affairs for submission to SCHEV.

D. External Merger Proposal Review and Approval: SCHEV

1. SCHEV staff reviews the program merger proposal, communicating with the Vice Provost and/or Provost on items needing clarification and/or additional information. The staff then submits its recommendation on approval to the Council's Academic Affairs Committee for inclusion on the agenda of an upcoming meeting.

2. The program developers, Dean, and Vice Provost for Academic Affairs attend the Academic Affairs Committee meeting to respond to questions from the Committee. The Committee makes a recommendation to SCHEV for approval.

3. SCHEV formally notifies the University of its action on the program merger proposal. A copy of the notification is provided to the appropriate dean(s), chair(s), and proposal developers.

4. The merger is implemented as approved by SCHEV.

E. External Review and Approval: SACSCOC

If necessary, the President, through the University's SACSCOC Liaison, notifies the SACSCOC President about the merged degree program at least three months prior to the planned implementation date. Details about the need for this review may be found at the SACSCOC link http://www.sacscoc.org/pdf/081705/Substantive%20Change%20policy.pdf. If this external review is required:

1. SACSCOC determines whether a prospectus related to the merger is necessary and notifies the University accordingly. If a prospectus is required, it is prepared by the merger proposal developers, working with the Vice Provost for Academic Affairs, and submitted not later than three months prior to the program merger's scheduled implementation date.

2. SACSCOC reviews the program materials and/or prospectus and notifies the University about its decision to approve the merger.

F. Implementation

1. The University receives notification of SCHEV (and possibly SACSCOC) approval and addresses any stipulations noted by one or both organizations.

2. Implementation begins—including student recruitment, budget requests, course scheduling, faculty assignment/reassignment/recruitment, *University Catalog* program and course descriptions (see Appendices E and F) and other actions related to this merged program.

3. Faculty members ensure students in former programs have teach-out plans or transfer into merged program plans. Acceptance of new students begins.

4. Discontinuance of previous programs ensues (next section).

PROGRAM DISCONTINUATION OR CURTAILMENT

There are University, SCHEV, and SACSCOC policies and procedures that must be followed for the discontinuation or curtailment of a currently authorized academic degree program. Discontinuation is defined as the elimination of a program. Curtailment refers to a significant reduction in the scope of the program. The Old Dominion University policies on discontinuation or curtailment may be found in Appendix A and SCHEV policies, procedures and forms are located in Appendix H(5). In addition, Appendix H(7) should be referenced for SCHEV's policies on Program Productivity and Viability. Programs will be periodically reviewed to determine if they meet SCHEV's guidelines for productivity and viability. The following information outlines the steps that must be taken to discontinue or curtail an approved degree program.

A. Initiation of Program Discontinuation or Curtailment

1. The chair (or other academic administrator) consults with administrators and faculty involved in overseeing the program about discontinuation or curtailment of the program.

2. The initiator submits documentation to the Chair and/or Dean regarding the proposed action for either discontinuation or curtailment of a program. The written recommendation must include:

    a. The specific facts precipitating the need for program discontinuation or curtailment;
    b. A description of the proposed change and its rationale;
    c. A preliminary analysis of financial impact;
    d. A projection of the possible impact of affected faculty, staff, students;
    e. A revised human resource plan; and
    f. A timetable for implementation.

3. The Dean provides documentation on discontinuation or curtailment to the Vice Provost for Academic Affairs.

B. Internal Review and Approval of Proposal for Discontinuation or Curtailment

1. The Dean, Chair, and college undergraduate curriculum committee conducts a review of the program. This review includes the following criteria, at a minimum:

    a. Relevancy and relationship of the program to the mission and objectives of the College and University;

    b. Overall quality of the program;

    c. Cost and revenues associated with the program;

    d. Student enrollment and productivity;

    e. Current and projected relationship to other programs;

    f. Distinctive features of the program;

    g. Impact on women and minorities;

    h. Implications with respect to research;

      i. Impact on student needs;

      j. Placement and employment opportunities for students; and

      k. Alternatives to discontinuation or curtailment of the program.

2. The Vice Provost provides documentation to the Provost for analysis; the Vice Provost simultaneously submits the review, recommendations and other appropriate documentation to the Chair of the Faculty Senate and President of the Student Government Association.

3. The Faculty Senate and Student Government Association forward their recommendations to the Provost.

4. The Provost reviews all of the materials (reviews, recommendations, and other appropriate documentation) and makes a recommendation on discontinuation or curtailment of the program to the President.

5. The President reviews all documentation, and makes a recommendation to the Board of Visitors for action.

6. The Board of Visitors reviews the recommendations, and approves discontinuation or curtailment of the program.

C. External Approval: SCHEV (Discontinuation Only)

1. Upon the approval of the Board of Visitors to discontinue a degree program, a formal proposal, according to the SCHEV format contained in Appendix H(5), will be prepared by the Vice Provost for Academic Affairs, in collaboration with the faculty/department/school, college, or other appropriate unit at the University.

2. If the proposed program closure is in a critical shortage area, question #9 related to critical shortage areas on the SCHEV format must be addressed. Information on critical shortage areas is available at the Department of Education web site: http://www.virginiagov/VDOE/newvdoe/teached.html, the Virginia Employment Commission at: http://www.vec.virginia.gov/vecportal/wia/commprofiles.cfm, and the U. S. Bureau of Labor Statistics at: http://www.bls.gov/emp/home.htm.

3. The individual designated to develop the proposal will consult with the Vice Provost for Academic Affairs.

4. The Vice Provost will work closely with the developer(s) in the preparation of the formal proposal.

5. The completed proposal is submitted to SCHEV for review and approval.

6. SCHEV staff reviews the proposal and submits it with a recommendation to SCHEV's Academic Affairs Committee. The Committee's recommendation is submitted to SCHEV for action.

7. SCHEV notifies the President of its action on the proposed program discontinuation.

8. Copies of SCHEV's notification are distributed to the appropriate department/school chair and dean.

9. The University proceeds with actions described in the proposal to discontinue the academic degree program.

D. External Approval: SACSCOC (Discontinuation Only)

The President, through the University's SACSCOC Liaison, notifies the SACSCOC President about the closed program immediately following the decision to end a program. The following steps take place in this process:

1. The SACSCOC Liaison provides SACSCOC with a description and timeline for the planned teach-out and the University's notification to students regarding this plan.

2. SACSCOC reviews the Teach-out Agreement and notifies the University about its acceptance of this plan.

COURSE RELATED ACTIONS

PROPOSING NEW COURSES AND MODIFYING OR DEACTIVATING CURRENT COURSES

The following actions relate to the development and approval of new undergraduate courses, modification of currently approved courses, and deactivation of existing courses. A copy of Old Dominion's policy on approval of course-related actions and the process required for such actions are located in Appendices E and F.

1. Faculty members propose establishing a new course, modifying a current course, or deactivating an existing course and submit this proposal to the department/school chair. The Course Inventory Management (CIM) system in CourseLeaf will be used to process and record this transaction (see Appendix F). This system follows a workflow in which the new, revised or discontinued course is approved in a step-by-step process.

2. The department/school Chair submits the course proposal to the department/school committee that has responsibility for reviewing and making recommendations on undergraduate curriculum.

   Note: If the proposal is to deactivate an existing course, the department/school Chair must notify the chair(s) of other department/school(s) that require the course in their program(s). The chair(s) of these departments must review the change(s) and inform and forward any concerns to the chair of the course's home department/school.

3. The department/school curriculum committee reviews the proposal and submits it to the department/school chair.

4. The department/school Chair reviews the proposal, taking into consideration any comments from the chairs of departments/schools that use the course in their programs, and submits the proposal to the college undergraduate curriculum committee for review and recommendation.

5. The college committee reviews the course proposal and submits it to the college Dean for review.

6. The college Dean or designee reviews the course proposal. If he/she approves the course proposal, it is submitted to the Office of Academic Affairs for review. Requests for changes in existing courses to become effective for the next academic year must be submitted before November 1 while requests for new courses may be submitted at any time.

7. The Assistant Vice President for Undergraduate Studies, the Provost's designee for course approval actions, reviews the proposal recommended by the Dean, college committee, and department/school Chair and committee.

   a. Questions about potential duplication, missing information, and rationale will be directed to the chair and college Dean for response.

   b. The Assistant Vice President makes a decision on approval of behalf of the Provost, consulting with the Provost or Vice Provost for Academic Affairs, as necessary.

8. Courses not offered for five years will be deactivated by the Office of Academic Affairs. Deans will be informed of these actions.

9. The following implementation actions will take place after approval of the proposal:

   a. Approved new courses will be implemented either at the beginning of the semester requested by the proposing department/school or the semester following approval.

b. Changes to currently approved courses will be effective with the publication date of the next *Undergraduate Catalog* (see Appendix B).

c. Courses approved for deactivation will be discontinued at the end of the academic year in which the action is requested.

d. All actions related to new courses, course changes and course deactivations will be included in the next edition of the *Undergraduate Catalog* (see Appendix B).

General Education Courses

Proposals to add, change, or deactivate courses included in General Education Requirements must be submitted to the Faculty Senate and Office of the Provost and Vice President for Academic Affairs. All such proposals related to General Education are conditional on approval by Committee A of the Faculty Senate and the Office of the Provost and Vice President for Academic Affairs.

Proposals related to General Education courses follow the same procedure identified above (for proposing new courses or modifying existing courses). In addition, Parts 2 and 3 (Appendix G) must be submitted to the Assistant Vice President for review and submission to Committee A of the Faculty Senate.

Committee A reviews the proposal for a new course related to the General Education Program requirements and submits its recommendation to the Assistant Vice President. If Committee A recommends that the course be added to the General Education Program requirements, it will follow the same procedure as other courses, and given the appropriate letter designation. If Committee A recommends against adding the course to the General Education Program requirements, it will remain as a regular undergraduate course, as approved by the college and the Assistant Vice President.

Committee A also reviews proposals to change current General Education courses and submits its recommendation to the Assistant Vice President.

ESTABLISHING UPPER-LEVEL
WRITING INTENSIVE (W) COURSES WITHIN THE MAJOR

The procedure for proposing a course in the major to be designated as a Writing Intensive (W) course for the purpose of fulfilling General Education Program requirements generally follows the process outlined for the proposal of a new course.

In addition to the information entered through the Course Inventory Management system (Appendix F), the department/school proposing a major course for the W designation must provide additional information related to writing-intensive requirements. The following areas must be included in the proposal.

1. A descriptive overview of the course.

2. A statement on how the course will address the General Education Program goal of demonstrating written communication skills at the upper level in the major.

3. A description of how the proposal will address the following criteria for a W course.

    a. Students will demonstrate mastery of the subject matter through writing formal documents.
    b. A series of individual, not group, writing assignments is required.
    c. How the course instructor will provide feedback to the student, focusing on both content and writing style.
    d. Appropriateness of the writing assignments. Such assignments include laboratory reports, critiques of performances or exhibitions, case studies, and other writing across the disciplines techniques appropriate to the discipline of the major.

4. The department/school must also submit General Education Parts 2 (expected outcomes) and 3 (syllabus) as part of this process. Appendix G includes forms related to this requirement.

5. The proposal for a W course within the major is reviewed by Faculty Senate Committee A (Undergraduate Curriculum and Programs). The Committee submits its recommendation for the proposal to the Provost.

6. With approval of the Provost or her/his designee, the course will be assigned a W designation and included in the next edition of the *Undergraduate Catalog*. This is accomplished through Course Inventory Management System (see Appendix F).

UPPER-DIVISION GENERAL EDUCATION

OPTION A: MINOR AND *OPTION B*: INTERDISCIPLINARY MINOR

The following describes the process for establishing a minor. If approved, undergraduate students who complete the minor will fulfill the upper-level General Education Program requirements under Option A or Option B (see *Undergraduate Catalog*—Undergraduate Degree Requirements). The review and approval process for a new minor is internal and culminates with the President.

A. Proposal

1. The concept of a new minor should be reviewed with the department/school Chair, college Dean, and Provost or designee prior to the development of a formal proposal. In the case of an interdisciplinary minor, each department/school Chair and Dean is involved.

2. Faculty members in one or more departments/schools design the minor and formulate a proposal that fully describes its content, requirements, rationale, statement of need and demand, resources necessary for implementation, and plan for implementation. The proposal must conform to the University policy on Upper-Division Studies Outside the Major with Option A or Option B (see *Undergraduate Catalog*—Undergraduate Degree Requirements).   It will be recorded on or accompanied by a *Proposal for a New Minor or Significant Changes to an Existing Minor* (see Appendix D). The proposal must also include evidence of the demand/need for the proposed minor.

B. Proposal Review

1. The proposal for the minor is submitted to one or more department/school undergraduate curriculum committees for review and recommendation. The recommendation by the committee(s) is transmitted to the department/school chair(s) for review.

2. The department/school chair(s) review the minor proposal, taking into consideration the recommendation of the curriculum committee. The chair(s) make a recommendation on approval, and forward the proposal to the college(s) undergraduate curriculum committee(s) for review.

3. The college curriculum committee(s) review the proposal and make a recommendation to the dean(s).

4. The dean(s) review the proposal, taking into account all prior recommendations, and make a recommendation.

5. If approved by the dean(s), the proposal is submitted to the Office of Academic Affairs for review by the Provost's designee, the Assistant Vice President for Undergraduate Studies.

6. The Assistant Vice President reviews the proposal for a new minor recommended by the dean(s) and college/department/school committees.

   a. The Assistant Vice President consults, as necessary, with members of the Provost's staff on questions related to approval of the proposed minor. Questions about

potential duplication, missing information, and rationale will be directed to the appropriate dean(s) for response.

b. The Assistant Vice President forwards the proposal for the minor and all supporting documentation to the Faculty Senate's Committee A (Undergraduate Curriculum and Programs) for review and recommendation since minors may be used to fulfill upper-level General Education Program requirements.

C. Proposal Approval

1. Committee A reviews the proposed minor and submits its recommendation to the Faculty Senate.

2. The Faculty Senate reviews and votes on Committee A's recommendation on the proposed minor. The Senate's recommendation is submitted to the President for approval.

3. The President consults with the Provost, who in turn consults with the Provost's Council (PC), on whether the minor should be approved.

D. Implementation

A new approved minor will become effective with the term requested by the department(s)/ school(s) and will be included by the department(s) in the next edition of the *Undergraduate Catalog*. (See Catalog Management, Appendix B)

OPTION C: INTERNATIONAL BUSINESS AND REGIONAL COURSES OR AN APPROVED CERTIFICATION PROGRAM SUCH AS TEACHING LICENSURE

The following describes the process for establishing an approved Upper-Division General Education set of requirements under Option C (see *Undergraduate Catalog*—Undergraduate Degree Requirements). Currently, the International Business Regional Courses and the Professional Education Core in Teaching Licensure programs are established at ODU; both meet Upper-Division General Education requirements under Option C. Approval for an additional certification program may be proposed by a department with the review and approval process being internal and culminating with the President.

A.   Proposal

1.   The concept for a certification program should be reviewed with the department/school chair, college dean, and Provost or designee prior to the development of a formal proposal.

2.   Faculty members formulate a proposal that fully describes content, requirements, rationale, statement of need and demand, resources necessary for implementation, and plan for implementation. The proposal must conform to the University policy on Upper-Division Studies Outside the Major with Option C (see *Undergraduate Catalog*—Undergraduate Degree Requirements).

B.   Proposal Review

1.   The proposal for a new certification program (see Appendix E) is submitted to the department/school undergraduate curriculum committee for review and recommendation. The recommendation by the committee is transmitted to the department/school Chair for review.

2.   The department/school Chair reviews the proposal, taking into consideration the recommendation of the curriculum committee. The Chair makes a recommendation on approval, and forwards the proposal to the college undergraduate curriculum committee for review.

3.   The college curriculum committee reviews the proposal and makes a recommendation to the Dean.

4.   The Dean reviews the proposal, taking into account all prior recommendations, and makes a recommendation.

5.   If approved by the Dean, the proposal is submitted to the Office of Academic Affairs for review by the Provost's designee, the Assistant Vice President for Undergraduate Studies.

6.   The Assistant Vice President reviews the proposal recommended by the Dean and college/ department/school committees.

a. The Assistant Vice President consults, as necessary, with members of the Provost's staff on questions related to approval of the Option C proposal. Questions about potential duplication, missing information, and rationale will be directed to the appropriate dean(s) for response.

b. The Assistant Vice President forwards the proposal and all supporting documentation to the Faculty Senate's Committee A (Undergraduate Curriculum and Programs) for review and recommendation since Option C may be used to fulfill upper-level General Education Program requirements.

C. Proposal Approval

4. Committee A reviews the proposed certification program and submits its recommendation to the Faculty Senate.

5. The Faculty Senate reviews and votes on Committee A's recommendation on the proposed certification program. The Senate's recommendation is submitted to the President for approval.

6. The President consults with the Provost, who in turn consults with the Provost's Council (PC), on whether the proposed certification program should be approved.

D. Implementation

A new approved certification program under Option C will become effective with the term requested by the department/ school and will be included in the next edition of the *Undergraduate Catalog* (see Catalog Management, Appendix B).

OPTION D: UPPER-DIVISION COURSE WORK FROM ANOTHER COLLEGE OUTSIDE OF AND NOT REQUIRED BY THE MAJOR

There are no internal or external approval processes for Option D. Students are advised to enroll in courses as specified for this requirement (see *Undergraduate Catalog*—Undergraduate Degree Requirements).

Six hours of elective upper-division course work from outside (and not required by) the student's major are required in this option. Transfer courses and study abroad courses may be used to meet the requirement. Military Science and Leadership (MSL) and Naval Science courses (NAVS) may also be used to meet the Option D requirement for all students, regardless of the student's major and college. Further details about this option may be found in the *Undergraduate Catalog*.

MAJORS

The following describes the steps necessary to propose and obtain approval of a new major in a currently approved degree program.   The policies and form related to this type of curricular action are located in Appendices A and B.

A.   General Rules

1.   The proposed major must be incorporated in and consistent with the content of a currently approved degree program, be in the same discipline area, and consistent with the nature, level, and purpose of the host degree program. For example, an undergraduate-level major cannot be established under a graduate degree and a social science major could not be included in an engineering degree.

2.   The major within a degree program must include a minimum of 25% of the core area of the program. For example, a degree program in business administration includes core courses for all majors within that program, and those core courses comprise more than 25% of the degree requirements (exclusive of general education and electives).

3.   The development of a new major should be included in the department/school and college planning and budgeting process, as needed.

4.   The proposal must include a full description of the new major, including the curriculum, a rationale for implementing it, target audiences, and resource needs.

5.   The proposal process is internal and requires review and recommendation by the department/school, college undergraduate curriculum committee, and dean, as well as approval by the Provost.

B.   Development and Approval Process

1.   Discussion should take place between the faculty member(s) proposing a new major and the department/school Chair, college Dean, and Assistant Vice President for Undergraduate Studies about its feasibility/acceptability of the concept.

2.   Assuming the concept is acceptable, a proposal development team is established to design the new major, collect market data, as needed, and prepare a proposal that addresses all of the elements identified above.

3.   The proposal is reviewed by the department/school undergraduate curriculum committee and a recommendation forwarded to the department/school chair for review.

4.   The department/school chair reviews the proposal, makes a recommendation on the implementation of the proposed major, and submits the proposal to the college undergraduate curriculum committee for review.

5.   The college curriculum committee reviews the proposal and submits a recommendation to the college Dean.

6. The Dean reviews the proposal and submits a recommendation to the Provost on its implementation.

7. The Provost consults with the Vice Provost for Academic Affairs and other administrators or faculty, as appropriate, reviews the proposal, and makes a decision on the implementation of the major.

C. Implementation

Faculty and department chairs are encouraged to launch new majors when the subsequent edition of the *Undergraduate Catalog* is published. The Catalog Management (CAT) system, in Appendix B, is accessed when revising the catalog.

D. Changes to Majors

Faculty and department chairs who wish to make revisions to majors will do so via the Curricular Change Approval Form. Such changes will include a description of the proposed change, rationale, new requirements, and other specific information required to process the change.

CERTIFICATES: CREDIT AND NON-CREDIT

The following describes the process for proposing and approving academic-credit-based and non-credit-based certificate programs. A certificate is generally defined as a coherent course of study with specific requirements, generally including an average of four or five classes.

Credit-based certificates require internal approval as well as external notification and possible approval. All certificates developed after 2012 are submitted to SCHEV in a formal notification process. The University policy that specifically defines certificates is included as Appendix A(4). The form used for the proposal is available in Appendix C; attachments, as appropriate, are included with the form.

A.   Credit-Based Certificates

1. A proposal for the certificate that will be offered for academic credit usually originates with and is developed by a faculty member or group of faculty in a specific discipline or a closely-related set of disciplines.

   The proposal—submitted on a Curriculum Change Approval Form—clearly describes the certificate and its level and purpose, provides details about the curriculum, defines the requirements (at minimum the completion of nine credit hours in a coherent sequence of courses with a 2.00 grade point average for undergraduate students), includes a rationale, documents the demand/need for the certificate, projects anticipated enrollment, discusses any resource implications, describes the plan for assessment, and identifies the planned implementation date.

2. The interested faculty consult with the Vice Provost for Academic Affairs or his/her designee to determine next steps. The Vice Provost consults with SACSCOC to determine whether SACSCOC approval is required.

3. The certificate proposal is submitted for review and recommendation to the appropriate department/school curriculum committee, department/school Chair, college undergraduate curriculum committee, and college Dean.

4. The college Dean submits the proposed certificate with his/her recommendation, together with all previous recommendations, to the Provost for review and approval.

5. Documentation related to the new certificate is completed and forwarded to SCHEV.

6. If the certificate involves a substantive change, according to SACSCOC definitions (http://www.sacscoc.org/pdf/081705/Substantive%20Change%20policy.pdf), the Vice Provost works with the department to provide SACSCOC with all necessary documentation related to this new offering.

7. Once approved by the Provost, and entered into the *Undergraduate Catalog* (see Appendix B), the certificate may be launched on the date specified.

B. Professional Development/Continuing Education (Non-Credit) Certificate

1. The proposal for a new non-credit certificate is developed and/or reviewed by the faculty and appropriate continuing education administrator and submitted to the Dean of the College of Continuing Education and Professional Development. The proposal must address the curriculum and student demand; it will also identify projected revenues, required resources, and faculty members who will teach the course(s).

   a. If the proposal is developed by someone other than the continuing education/public service director, such as a faculty member, the individual who initiated the proposal, along with the associated director, will make a recommendation to the Dean of the College of Continuing Education and Professional Development and the dean of the college in which the faculty resides regarding whether the certificate should be approved.

   b. If the proposal was developed by the continuing education director, it will be submitted to both deans for review and approval.

2. The college Dean and the Dean of the College of Continuing Education and Professional Development and/or their designees review the proposed certificate and make a decision as to whether it will be implemented. They evaluate the integrity of the certificate curriculum, the demand for it, the quality of the faculty proposed to offer it, and the resource/revenue implications of the proposal.

3. Upon approval of the college Dean and the Dean of the College of Continuing Education and Professional Development, the proposed certificate will be launched.

APPENDICES

APPENDIX A

Old Dominion University Policies
Related to Curricular Changes

University Policy on
Approval of Curricular Changes, New Courses and Course Changes

A. Curricular Changes
1. Significant curricular changes, such as creation of a major or minor, creation or deletion of emphasis areas, degree policies or changes that exceed the University's minimum, or other substantial changes in curriculum will neither be effective nor implemented without the approval of the Provost and Vice President for Academic Affairs.
   a. Recommendations at the appropriate departmental, college, and University levels will precede the decision by the Provost and Vice President for Academic Affairs. This process includes department chairs, departmental and college governance committees related to curriculum, the dean of the academic college and the Faculty Senate (when applicable, such as for General Education requirements).
   b. In addition, all proposed changes in curriculum that rely upon the resources of another college or department will require consultation and agreement by the providing unit prior to approval by the Office of Academic Affairs.
2. All curricular changes will be fully documented and indicate all approvals. At a minimum, this documentation will include a full description of the change, rationale, resources needed if applicable, and implementation process, which will include a plan for notification of students and a timetable.
3. Approved changes will be effective with the publication of the next Catalog. Changes shall not normally be applied to students graduating under earlier Catalogs.
4. Changes may not be accepted during the Catalog preparation period. The deadline for the submission of any curricular changes that are intended to be effective the beginning of the following academic year should be December 1.

B. Credit-Bearing Courses
   All requests for new credit-bearing courses or course changes must be submitted in the proper format to the Office of the Provost and Vice President for Academic Affairs after review and approval by the appropriate department and college committee, the department chair and the dean.

1. Changes in courses that are offered as service courses for majors in other departments should be discussed with the chairs of such departments prior to approval of the change. Proposed deactivation of courses that are offered as service courses for majors in other departments will require consultation and agreement by the affected department prior to approval by the Office of Academic Affairs.
2. Requests for changes in existing courses to be active for the next academic year should be submitted before November 1. Approved changes in existing courses will be effective with the publication of the next Catalog. Requests for new courses may be submitted at any time to be effective no sooner than the next semester.
3. The Office of Academic Affairs will identify courses not offered for five years and inform the affected department chair and dean that the courses will be deactivated. These courses will remain active only upon the request of the department chair and approval from the Office of Academic Affairs.

C. Noncredit Courses
1. All requests for new noncredit courses or course changes must be submitted in the proper format to the Office of the University Registrar after review and approval by the appropriate dean.

- Approved by the president
January 22, 1988
Revised August 4, 1996
Revised October 28, 2004
Revised April 9, 2007
Revised October 17, 2012

University Policy on the Review of Academic Programs, Departments or Colleges for the Purpose of Possible Curtailment or Discontinuance

1. **General Statement of Policy**
   This policy provides the process for evaluation that shall be followed for the review of academic programs, departments or colleges for the purpose of possible curtailment or discontinuance.

   The process described in this policy should be conducted expeditiously by all participating, reviewing, recommending, and deciding bodies. Failure to comply with the time limits may cause a forfeiture of the right to comment, review or recommend. Time limits shall be calculated in calendar days.

2. **Process for the Evaluation of Programs, Departments or Colleges**
   The following process shall be followed in evaluating academic programs, departments, or colleges for possible curtailment or discontinuance.
   1. The affected unit's program director, chair, academic dean, or provost and vice president for academic affairs ("initiator") may initiate the action for possible curtailment or discontinuance. The initial recommendation, with the approval of the provost and vice president for academic affairs, if he/she is not the initiator, shall be in written form and provided simultaneously to the dean(s) of the affected unit(s), and the affected unit(s). The initial recommendation shall specify the facts precipitating the need for change, the proposed change and rationale and preliminary analysis of financial impact. This document shall also project the possible impact upon affected faculty, staff, and students; a revised human resource plan for these individuals; and the desired timetable for implementation.
   2. The initiator shall consult closely with the administrators and faculty of the affected unit(s).
   3. Upon receipt of the initial recommendation, and within forty-five (45) days, the dean(s) and the unit(s) to be affected, including the relevant college governance unit(s), shall, either jointly or separately, conduct an appropriate review of the program, department, or college, considering, among other things, the following criteria. The criteria need not be evenly weighted, nor should the list be considered exclusive.
      a. The relevancy and relationship of the program to the mission and objectives of the college and university.
      b. The overall quality of the affected unit presently and potentially.
      c. Cost and revenues associated with the affected unit.
      d. Student enrollment/productivity.
      e. The current and projected relationship to other programs, departments, or institutions.
      f. Distinctive and unique features in concept, design or implementation.
      g. Impact on women and minorities.
      h. Implications with respect to research.
      i. Impact on student needs.
      j. Placement and employment opportunities for students.
      k. Alternatives to curtailment, discontinuation, consolidation, or significant reorganization.

4. Within fifteen (15) days prior to the expiration of the time for review, the provost and vice president for academic affairs shall notify the chairs of the Senates that materials will be sent to them for action pursuant to this policy.

5. After review at the college level, the academic dean (including the college's governance unit(s)), and the affected unit will forward their recommendations, with all supporting documentation, within the time prescribed, simultaneously to the Faculty Senate, Student Senate and provost and vice president for academic affairs for review.

6. Within thirty (30) days of receipt of materials, the Faculty and Student Senates shall forward their recommendations to the provost and vice president for academic affairs.

7. The provost and vice president for academic affairs shall conduct an independent analysis of the initial recommendation (unless he/she initiated the process). Within fifteen (15) days of receipt of recommendations from the Senates, the provost and vice president for academic affairs shall review the recommendations of the dean(s), affected unit(s), Faculty Senate and Student Senate and make a recommendation of proposed action to the president.

8. Within fifteen (15) days of receipt of the provost and vice president for academic affairs' recommendations, the president shall review the recommendation of proposed action, consult any parties which are deemed appropriate, and make a final decision on whether or not the program, department or college shall be curtailed or discontinued. Upon completion of this review, the president shall make a recommendation on the matter to the Board of Visitors for action. After the Board has made its decision on the matter, the president shall inform all members of the university community in an appropriate manner.

3. To the greatest extent possible, the status quo shall be maintained within and with respect to the affected unit(s) until such time as a final decision has been reached by the Board of Visitors and it has directed the president to take action.

- Approved by the Board of Visitors
March 11, 1991

University Policy on Program Review

Institutional vigor, integrity, and distinction are dependent in good measure on a regular and critical review of ongoing programs. This process should not be prompted solely by the imperative of visitations by professional, regional, or national accrediting agencies. The university should regularly affirm that its academic offerings continue to serve the legitimate professional, intellectual, and aesthetic needs of the community and region that it serves. Refinement and redefinition of the types and scope of programs should reflect changing societal needs while maintaining the selective educational core undergirding all baccalaureate programs and the selective and distinctive character and quality of graduate programs. Old Dominion University subscribes to this principle and shall continue to pursue a regular schedule of assessment.

A new impetus has been added to the need for program review. Universities are being confronted not only by changes in student demographics and societal needs but by decreasing fiscal resources. The result is an added objective for program review. Besides identifying weak programs or programs that are no longer relevant, the developing need to reduce the scope of institutional offerings will require that choices be made between and among programs. Selective program curtailment or discontinuation will be necessary in order to maintain the level of support and excellence of the remainder.

The policy is designed to describe the process and the basis for making the choices. It is recognized at the outset that there is no simple way to quantify the inherent value of a discipline. The criteria are intended to explore each program in terms of the university mission, student demand, program interrelationship, cost factors (productivity), and the impact of program curtailment or discontinuation. Based on the responses and subsequent to broad-based institutional discussions, judgments will be made. While prompted by fiscal constraints, it is clearly understood that university status dictates that some program judgments will represent educational objectives and values and resource allocations which mitigate comparison with cost and other factors of other programs. The continuing objective of the assessment process is to retain the appropriate balance among academic programs, research, enrichment activities, and public service. In sum, the changing environment requires a dynamic and timely response in order to maintain levels of excellence and to fulfill the mission of the university.

-Approved by the president
October 1, 2003

University Policy on Certificate Programs

Old Dominion University offers a variety of certificate programs that meet the same high-quality standards as its academic degree programs, while addressing the specific needs of students and professionals. Certificates may be pursued in conjunction with or independent from graduate or undergraduate degree programs.

Certificate programs offered by Old Dominion University include the following:

Credit-Bearing Programs

Certificate programs: These programs are available for those seeking a formal award certifying completion of undergraduate- or graduate-level work in academic or occupational fields of study. Such certificates are ideal for individuals who wish to explore areas of professional interest or for those who need to fulfill accreditation requirements. Such programs generally include a minimum of nine credit hours and a maximum of 21 credit hours.

Certificate of Advanced Graduate Studies (CAGS): The curriculum in such programs is designed for those seeking a formal award certifying completion of study beyond the master's level in an academic or occupational field of study. These programs are usually intended for professional licensure or professional development, and may be completed prior to or concurrent with doctoral studies, for those interested in such pursuits. The programs generally require a minimum of 24 credit hours.

The Curricular Change Approval Form must be completed for all new, revised, or discontinued credit-bearing certificate offerings, and submitted to appropriate parties for approval within six months of program initiation or discontinuance. Final approval of the Provost and Vice President for Academic Affairs is required.

Faculty in departments offering certificates will identify residency requirements for all prescribed coursework. The Office of the University Registrar confers certificates to those who have met requirements for these programs.

Non-Credit-Bearing Programs

Certificate programs: Non-credit certificates in specific fields may be offered and awarded by colleges at the University upon approval by the appropriate faculty and administrators. These programs are designed to provide continuing education experiences to individuals or groups, usually in a specific profession or vocation. Content in these offerings alone will not meet the requirements of credit-bearing coursework, unless otherwise specified.

The design of all non-credit certificates must follow University guidelines as established by the Office of Academic Affairs.

-Approved by the President
October 17, 1978
Revised May 21, 2014

APPENDIX B

Catalog Revision Process/Catalog Management (CAT)

Catalog Management (CAT)
Editing the *Undergraduate Catalog*

Those authorized to edit the *Undergraduate Catalog* will access **nextcatalog.odu.edu** via the Firefox browser, if available. The steps required for catalog revisions include:

1. Logging in with Midas ID and password
2. Selecting *Undergraduate Catalog*
3. Using tabs along the right side to access page(s)
4. Clicking the Edit Page icon at the top of the left hand side of the screen; this reveals the author's toolbar
5. Clicking the "pencil" (edit) symbol at the area of the catalog copy or the particular course requiring revision(s)
6. Making edits as needed
7. Saving the edits by clicking OK at the bottom of the page
8. At the conclusion of editing, clicking the green Start Workflow button in the lower right section of the page. (**Note**: All authorized editors of the page must have completed their edits prior to launching Start Workflow.)
9. Logging off by exiting the browser, closing the page or choosing "file" and "exit."

Department Chairs, Associate Deans, and other "approvers" in the CourseLeaf workflow will receive an automated email from Catalog Editor with a link to click on to review/edit and approve changes for courses and catalog edits as in the example below.

```
From: Catalog Editor [mailto:lilypadu@notify.courseleaf.com]
Sent: Wednesday, October 12, 2011 11:53 AM
To: Bowman, Judy
Subject: [Catalog] Review Request: jbowman

    The catalog has pending changes for your review, including
    /undergraduate/olddominionuniversity/index.html.
    Please visit:
     http://nextcatalog.odu.edu/courseleaf/approve/?role=jbowman
    to review pages and provide your feedback.
```

CONTACTS (for authorization and assistance):

Undergraduate Catalog
757.683.3260

Graduate Catalog
757.683.6406

APPENDIX C

Old Dominion University
Curricular Change Approval Form

OLD DOMINION UNIVERSITY
CURRICULAR APPROVAL FORM

The Curricular Approval Form should be used to propose (a) new programs, new majors/concentrations, or certificates, (b) simple modifications (i.e., change of delivery format or increasing/decreasing the total credit hours by fewer than six credits), (c) substantial modifications (i.e., significant changes to the core curriculum or focus of the program, conversion to new delivery format that is different from what was originally approved, increasing/decreasing total credit hours by six to 12 credits, (d) changes or revisions that exceed University minimum requirements, or (e) discontinuation of a program, major/ concentration, or certificate. Examples of changes that exceed University minimum requirements would be an increase in the GPA for admission and the establishment of a minimum grade or overall GPA in a program.

All proposals must be approved by the Department Chair, College Curriculum Committee, Dean, External Department Chair (if the proposal impacts or involves another department or program), and the Office of Academic Affairs before implementation. If changes are intended to appear in the upcoming Undergraduate or Graduate Catalog, they should be submitted to the Office of Academic Affairs in accordance with Catalog deadlines.

This form does not need to be submitted if the total credit hours for the program, major/concentration, or certificate do not change.

Proposed Action (check one)* _____ New ____ Simple Modification _____ Substantial Modification _____ Revision ____Discontinuance

Program Type (check one) ____ Program ____ Major/Concentration ____Certificate
*Depending on the type of proposed action requested, notification or approval from SCHEV and/or SACS may be required.

1. Name of Degree or Certificate Program *(include concentration, if applicable)*:

2. Description of Proposed Change:

3. Rationale for Proposal:

4. <u>Proposed Effective Term:</u>

5. <u>Program, Major/ Concentration, or Certificate Description and Requirements</u> *(to be used for catalog text)*:
   If proposal includes new or revised courses, please submit the appropriate information through the online Course Inventory Management (CIM) process in Courseleaf (nextcatalog.odu.edu/courseadmin). Note: Specific content courses are expected for each *certificate* proposal. **(Attach additional sheets, if necessary.)**

   a. <u>Admission Information</u> *(include requirements, standards, and deadlines, if applicable)*:

   b. <u>Degree Requirements:</u>

   c. <u>Curriculum</u> *(Include complete Course List and/or Plan of Study – Indicate total number of credit hours)*

   <u>Curriculum</u> *(continued)*:

d. Continuance Requirements *(if applicable)*:

e. Exit or Graduation Requirements

6. Assessment Plan for new or revised programs, majors/concentrations, or certificates:
   Completed in coordination with the Assistant Vice President for Institutional Effectiveness and Assessment. Please provide a summary of the planned assessment action.

7. Target Audience *(be specific)*:

8. Course Delivery Modality(ies):

9. Resources Needed:

APPROVED:

_____   _____
Originator of Request   Date   College Dean   Date

_____   _____
Department Chair   Date   External Department Chair(s)   Date
                                                                    (If the change impacts or involves another department or program)

_____   _____
Chair, College Curriculum Committee   Date   Undergraduate or Graduate Catalog Administrator   Date
                                                                     in Academic Affairs

_____
Vice Provost/SACS Liaison   Date

After final approval, please return the form to the Undergraduate or Graduate Catalog Administrator who will provide copies of the form to the SCHEV Liaison, the Office of Institutional Effectiveness and Assessment, the Office of Institutional Research, and the relevant college(s) and department(s).

For Administrative Use Only
ADMINISTRATIVE CODING

Effective Term _____   Major Code _____

College _____   Degree Code _____

Department _____

APPENDIX D

Proposal for a New Minor or
Significant Changes to an Existing Minor

**OLD DOMINION UNIVERSITY
PROPOSAL FOR A NEW MINOR
OR SIGNIFICANT CHANGES TO AN EXISTING MINOR**

A minor may be chosen by students to support the major, to offer greater job opportunities on graduation, or to provide recognition in a second area of study. Completion of an approved minor will meet the upper-division General Education requirement. A minimum of 12 credit hours, normally at the advanced level (300-400) in a specified field of study is required. Please refer to the *Undergraduate Catalog* for the complete policy on minors.

Minimum enrollment expectations for minors are five graduates in five years or the minor will be discontinued.

1. Name of proposed minor or minor to be changed:

2. Description of proposed minor or change to an existing minor:

3. Rationale for proposal: (address what the proposed minor will accomplish for students)

4. Majors likely to enroll in the minor (for new minors):

5. Projected enrollment and why (for new minors):

6. Proposed Effective Term:

7. Resources needed:

8. Program requirements: [List below all courses required for the minor, the prerequisites, and the total hours required for the minor. Submit the appropriate information through the online Course Inventory Management (CIM) process in CourseLeaf, nextcatalog.odu.edu/courseadmin, for all new courses/course changes]

9. Description (showing new copy or revised copy) for the next *Undergraduate Catalog*:

10. Schedule for offering courses for new minors (include whether the minor can be completed in two years and whether it will be available through Distance Learning):

11. Effect on current department course schedule—for new minors:

APPROVED

_____
College Dean   Date

_____   _____
Originator of Request   External Department Chair   Date
                                                  (if applicable)

_____   _____
Department Chair   Chair, Faculty Senate   Date
                                         Committee A

_____   _____
Chair, College Committee   Provost   Date

ADMINISTRATIVE CODING

Effective Term_____   Major Code_____

College_____   Degree Code_____

Department_____

APPENDIX E

Proposal for a New Certification Program

OLD DOMINION UNIVERSITY
PROPOSAL FOR A NEW CERTIFICATION PROGRAM

A certification program may be chosen by students to support the major, to offer greater job opportunities on graduation, or to provide recognition in a specific area of study. Completion of an approved certification program will meet the upper-division General Education requirement.

1. Name of proposed certification program:

2. Name of certification program sponsoring organization or agency:

3. Description of proposed certification program:

4. Rationale for program (address what the proposed certification program will accomplish for students):

5. Majors likely to enroll in the certification program:

6. Proposed Effective Term:

7. Resources needed, including human resources, library resources, facility resources, and funding resources:

8. Program requirements: [List below all courses required, the prerequisites, and the total hours required. Submit the appropriate information through the online Course Inventory Management (CIM) process in CourseLeaf (nextcatalog.odu.edu/courseadmin) for all new courses/course changes.]

9. Description (showing new copy or revised copy) for the next *Undergraduate Catalog*.

10. Schedule for offering courses (include whether the certification program can be completed in two years and whether it will be available through Distance Learning):

11. Effect on current department course schedule:

APPROVED

_____
College Dean   Date

_____   _____
Originator of Request   External Department Chair   Date
                                                (if applicable)

_____   _____

Department Chair   Chair, Faculty Senate   Date

Committee A

_____   _____

Chair, College Committee   Provost   Date

ADMINISTRATIVE CODING

Effective Term_____   Major Code_____

College_____   Degree Code_____

Department_____

Appendix F

Old Dominion University Course Inventory Management (CIM)
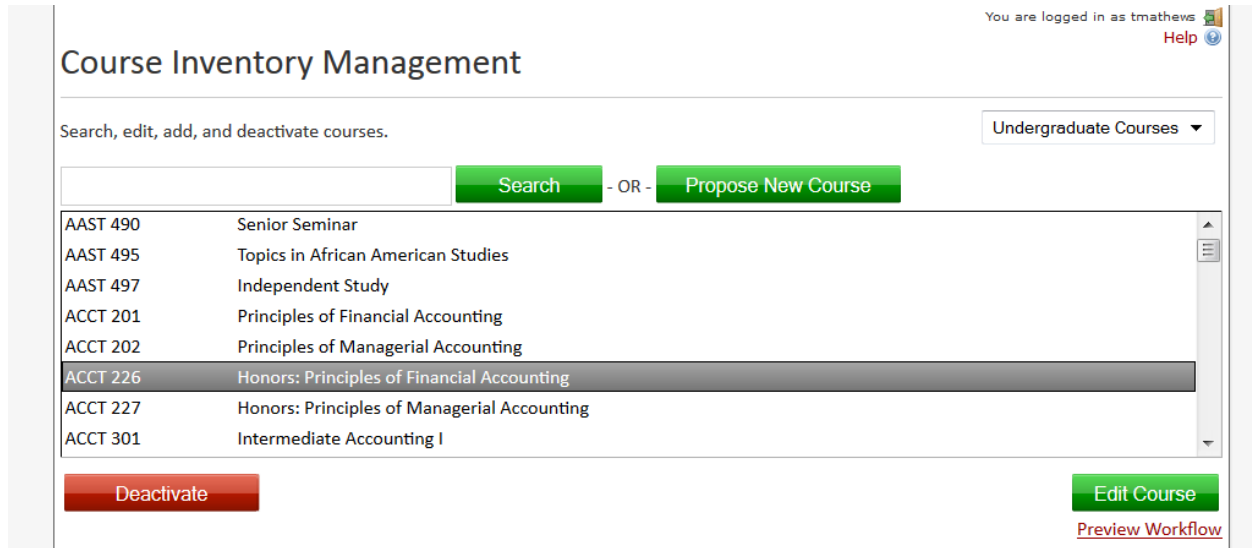
Course Inventory Management (CIM)
Proposal of New Courses, Course Changes and Course Deactivations

CIM site: **nextcatalog.odu.edu/courseadmin**

Authorized users may update and add courses as follows:
- For new courses *Propose New Course* is selected and data elements are entered.
- For course changes and deactivations, steps include:
  - selecting Search
  - selecting Edit Course or Deactivate

o   completing the data elements to be changed or an end term for course deactivation
- The *help* icon ⊘ offers additional information regarding entering the data elements. Help may also be found at **Help.courseleaf.com**.

CONTACTS (for authorization and assistance):

Undergraduate Courses
757.683.3260

Graduate Courses
757.683.6406

Appendix G

Proposals for Changes in General Education Courses

GENERAL EDUCATION—PART 1 of 3
CREDIT CATALOG ADD/CHANGE/DEACTIVATION FORM
(completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #_____

Request for: ☐ **New course** ☐ **Course change** ☐ **Course deactivation** ☐ **Course recertification**
Evaluate as: ☐ **Skill** ☐ **Ways of knowing** ☐ **Writing intensive course** ☐ **Requirement met in major***

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

_____
_____
_____

*List and submit Part 2 and Part 3 attachments for all courses that will be used to satisfy the requirement.

Enter all data for a new course. Enter only items to be changed for a course change. Enter End Term/Year for course deactivation.

Subject area: _____ Course number: _____   Start Term _____ Year _____
                                                              End Term _____ Year _____

Full Course Title_____

Banner Title ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
                              (30 character limit)
College:_____ Department _____ Credits _____

Course Description _____

_____

Prerequisite Waiver: ☐ 0 No waiver of prerequisite allowed   ☐ 1 Departmental approval required
                         ☐ 2 Instructor approval required   ☐ 3 Placement by department only

Course Repeat Limit [once a passing grade has been achieved]. Default ☒ Course can't be repeated for credit. Check box below if this course can be repeated for credit once a passing grade is earned.
        ☐ Course can be repeated for credit _____ times   ☐ Unlimited repeats allowed

Grading (check all that may be used) ☐ Normal Letter Grading   ☐ Pass/Fail   ☐ Audit

Corequisite Courses:_____
  (must be taken at the same time)   Enforce in Banner? _____ No   _____ Yes

Prerequisite Courses _____
(Check here if may be taken as a prerequisite or corequisite) ☐ Enforce in Banner? _____ No   _____ Yes

Equivalent Courses (e.g. Honors College courses):_____

Course contact hours per week   _____.__   Lecture Hours   _____.__ Other Hours (please specify)
                                _____.__   Lab Hours

Approved: _____ _____   _____ _____
              Department Committee   Date   Department Chair   Date

          _____ _____   _____ _____
              College Committee   Date   Dean of College   Date

          _____ _____
              Provost's Office   Date

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #1 Written Communication/100 Level (Skills)

Request for: ☐ New Course   ☐ Course Change   ☐ Course Inactivation   ☐ Course recertification
Evaluate as: ☐ Skill   ☐ Ways of knowing   ☐ Writing intensive course   ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#1 Written Communication/100 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Develop rhetorical knowledge by: *1. Analyzing and composing multiple forms of writing to understand how genre conventions shape readers' and writers' practices and purposes;*				

Expected Outcome (#1 Written Communication/100 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** _(SUBJ/CRSE#)_	**Weight** _(e.g., % of grade, # hrs of instr.)_
2. Practicing purposeful shifts in structure, content, diction, tone, formality, design, and/or medium in accordance with the rhetorical situation				
**Develop critical thinking, reading and information literacy skills by:** _1. Composing and reading for inquiry, learning, critical thinking, and communicating;_				
2. Using outside materials in their own writing through techniques such as interpretation, synthesis, response, critique, and design/redesign				
3. Incorporating outside materials through quotations, paraphrase, and summary				

Expected Outcome (#1 Written Communication/100 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Develop effective strategies for drafting texts by: *1. Working through multiple drafts of a project and recognizing the role of reflecting, revising, and editing in the process*				
2. Engaging in the collaborative and social aspects of writing processes, such as learning to give and to act on productive feedback to works in progress, both by and with peers and in one-on-one instructor conferences				
3. Critically reflecting on how they may further develop and apply writing skills in the future				
Develop knowledge of conventions by: *1. Demonstrating competency in grammar, punctuation, and spelling*				
2. Practicing genre conventions for structure, paragraphing, tone and mechanics				

Expected Outcome (#1 Written Communication/100 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
3. Understanding the concepts of intellectual property that motivate documentation conventions through application of recognized citation styles				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #2 Written Communication/200 Level (Skills)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#2 Written Communication/200 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Develop rhetorical knowledge by: 1. Analyzing and drafting a variety of compositions or genres shaped by readers' and writers' practices				

Expected Outcome (#2 Written Communication/200 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
2. Transitioning between situations and contexts by adjusting structure, content, diction, and tone				
3. Matching the capacities of different technologies to a range of audiences and rhetorical situations				
4. Understanding that rhetorical situations differ across communities and disciplines				
Develop critical thinking, reading, and information literacy skills by*:* *1. Using writing as a tool for critical thinking and reflection*				
2. Reading and writing several genres that utilize analysis, reflection, narrative, critique, and argument skills				
3. Locating primary and secondary research materials among library resources and evaluating them for credibility, sufficiency, accuracy, timeliness, and bias				

Expected Outcome (#2 Written Communication/200 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** _(SUBJ/CRSE#)_	**Weight** _(e.g., % of grade, # hrs of instr.)_
4. Using strategies to compose texts that integrate the writer's ideas with those from appropriate sources				
5. Understanding that thinking, reading, and literacy skills differ across communities and disciplines				
***Develop multiple strategies, or composing processes, to draft texts by**: 1. Working through multiple drafts of a writing project and reflecting on composing practices*				
2. Exploring strategies for the writing process and adapting them for a variety of technologies and modalities				
3. Learning to give and to act on productive feedback to works in progress				
4. Understanding that composing strategies and processes differ across communities and disciplines				

Expected Outcome (#2 Written Communication/200 Level)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Develop knowledge of conventions by: *1. Refining the understanding of linguistic structures, including grammar, punctuation, and spelling*				
2. Practicing genre conventions for structure, paragraphing, tone, and mechanics				
3. Demonstrating a clear understanding of intellectual property rights and applying citation styles systematically, according to disciplinary conventions				
4. Understanding that conventions differ across communities and disciplines				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #3 Mathematical (Skills)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#3 Mathematical Skills)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*

Expected Outcome (#3 Mathematical Skills)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** (SUBJ/CRSE#)	**Weight** (e.g., % of grade, # hrs of instr.)
Logical Reasoning: Students will be able to interpret sentences to contain the logical connectives "and," "or," "some," "all," and "none." They will be able to use deductive reasoning to draw conclusions from a series of statements and to identify appropriate generalizations or trends.				
Computational Skills: Students will develop facility in the language and symbols of mathematics and will be able to perform basic calculations and operations related to the application of mathematics or statistics				

Expected Outcome (#3 Mathematical Skills)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Data Interpretation: Students will be able to read and interpret visual displays of quantitative information such as bar graphs, line graphs, pie charts, pictographs, and tables. They will be able to use them to make predictions and draw inferences from the data.				
Problem Solving: Students will be able to read a word problem, set up the necessary equations that describe the problem, solve these equations using basic quantitative techniques, and interpret or draw a conclusion from the solution				
Quantitative Modeling: Students will be able to model physical and natural phemonema and assess validity of a model, make predictions from the model, and draw conclusions based on the model				
Attachments included:				

GENERAL EDUCATION—PART 2 of 3
Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #4 Oral Communication (Skills)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#4 Oral Communication)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Relate the principles of public speaking to a variety of extemporaneous speech situations				
Develop skill in researching a topic for a speech or professional presentation				

Expected Outcome (#4 Oral Communication)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** _(SUBJ/CRSE#)_	**Weight** _(e.g., % of grade, # hrs of instr.)_
Prepare and organize the content for a speech or professional presentation				
Improve the use of language in conveying messages				
Develop critical analysis while listening to speeches and professional presentations				
Deliver appropriate speeches and professional presentations using digital visual software with increased skill and confidence				
Develop an understanding of the communication styles and strategies of others				
Enhance the ability to express oneself with empathy and sensitivity, as well as with assertiveness				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #5 Information Literacy and Research (Skills)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#5 Information Literacy and Research)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Determine the nature and extent of the information needed for research				
Access information effectively and efficiently				

Expected Outcome (#5 Information Literacy and Research)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Critically evaluate information and information sources, such as library databases, collections, or websites appropriate to the field of research				
Use information effectively to accomplish a specific purpose or to complete a specific project				
Understand the economic, social, legal, and ethical issues surrounding the access and use of information				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #6 Language and Culture (Skills)

Request for: ☐ New Course   ☐ Course Change   ☐ Course Inactivation   ☐ Course recertification
Evaluate as: ☐ Skill   ☐ Ways of knowing   ☐ Writing intensive course   ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#6 Language and Culture)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*

Expected Outcome (#6 Language and Culture)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will be able to interpret (listening and reading) a language other than English at the novice level on the ACTFL standards of proficiency, or demonstrate through alternative means a similar or parallel knowledge of another language				
Students will be able to apply (speaking and writing) a language other than English at the novice level on the ACTFL standards of proficiency, or demonstrate through alternative means a similar or parallel knowledge of another language				
Students will be able to interpret non-verbal communications made by persons familiar with a language different from the student's own native language experience				

Expected Outcome (#6 Language and Culture)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will be able to identify the significant criteria that enhance the cultural identity of individuals other than those from the student's native language experience				
Students will be able to distinguish the similarities and differences among individuals using the same language who live in different regions or different parts of the world				
Students will be able to discuss their role in developing cross-cultural understanding, or a similar or parallel understanding in another language				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #7 Human Creativity (Ways of Knowing)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#7 Human Creativity)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will demonstrate an appreciation of aesthetic experiences in the chosen discipline				

Expected Outcome (#7 Human Creativity)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students write and discuss these experiences with greater understanding, which necessitates critical analysis according to the norms of the discipline				
Students will critically assess the merits of their work and the work of others				
Students will critically assess the intellectual traditions reflected in a particular work				
Students will come to understand the value of common human needs and desires expressed through creative expression				
Attachments included:				

(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #8 Literature (Ways of Knowing)

Request for: ☐ New Course   ☐ Course Change   ☐ Course Inactivation   ☐ Course recertification
Evaluate as: ☐ Skill   ☐ Ways of knowing   ☐ Writing intensive course   ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#8 Literature)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will critically analyze literature and assess its contribution to our cultural heritage				

Expected Outcome (#8 Literature)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Through critical reading and analysis, students will develop an understanding of the effective use of the English language				
Through critical reading and analysis, students will develop the ability to make informed judgments about writers' style and content				
Students will develop an understanding of the perspectives of a diverse group of writers that may include women writers, minority writers, and writers from non-American cultures				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #9 The Nature of Science (Ways of Knowing)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#9 The Nature of Science)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will demonstrate their comprehension of a body of scientific knowledge				

Expected Outcome (#9 The Nature of Science)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will develop the ability to apply concepts to new situations, solve problems, and interpret evidence that is presented in various formats, such as verbally, numerically, and graphically as appropriate to the content of the course				
Students will be able to describe the domain and methods of scientific thinking, and be able to distinguish between questions that can and cannot be answered scientifically				
Students will describe the role of experiment and observation in the development of scientific theory and knowledge				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #10 Human Behavior (Ways of Knowing)

Request for: ☐ New Course   ☐ Course Change   ☐ Course Inactivation   ☐ Course recertification
Evaluate as: ☐ Skill   ☐ Ways of knowing   ☐ Writing intensive course   ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#10 Human Behavior)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will compare basic theories and models and identify their strengths and weaknesses				
Students will be able to define key disciplinary vocabulary and terms				

Expected Outcome (#10 Human Behavior)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will be able to identify professional applications of disciplinary concepts				
Students will describe how hypotheses and research questions are formed				
Students will describe how data are collected, measured, and analyzed				
Students will explain how the social sciences have contributed to our understanding of society				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #11 Interpreting the Past (Ways of Knowing)

Request for: ☐ New Course ☐ Course Change ☐ Course Inactivation ☐ Course recertification
Evaluate as: ☐ Skill ☐ Ways of knowing ☐ Writing intensive course ☐ Requirement met in major*

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#11 Interpreting the Past)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will assess the strengths and weaknesses of historical methodologies				
Students will identify, explain, and use historical concepts and terms				

Expected Outcome (#11 Interpreting the Past)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** _(SUBJ/CRSE#)_	**Weight** _(e.g., % of grade, # hrs of instr.)_
Students will hypothesize causal relationships in history such as economic, social, intellectual, political, and cultural issues				
Students will construct a critical chronology of the subject				
Students will identify basic elements of the relevant geography				
Students will make effectively logical and coherent arguments based upon factual evidence				
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #12 Philosophy and Ethics (Ways of Knowing)

Request for: ☐ **New Course** ☐ **Course Change** ☐ **Course Inactivation** ☐ **Course recertification**
Evaluate as: ☐ **Skill** ☐ **Ways of knowing** ☐ **Writing intensive course** ☐ **Requirement met in major***

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#12 Philosophy and Ethics)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
LOWER DIVISION COURSE(S)				
Students will acquire a basic understanding of several foundational questions in one or more of the major areas of philosophy, e.g., metaphysics, epistemology, and value theory (including ethics)				

Expected Outcome (#12 Philosophy and Ethics)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Students will acquire a basic familiarity with the answers that diverse schools of philosophical or religious thought have proposed to foundational philosophical questions and the arguments with which they have supported these answers				
Students will acquire a facility with critical thinking and reasoning, especially concerning the construction and evaluation of arguments				
UPPER DIVISION COURSE(S)				
Distinguish between normative and descriptive questions and to reason critically about the former				
Describe, compare, and contrast diverse bodies of thought about what constitutes ethically acceptable conduct and an ethically good character				
Explain how ethical values are reflected in various cultural, social, economic, legal, and political practices and institutions				

Expected Outcome (#12 Philosophy and Ethics)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Attachments included:				

Old Dominion University
EXPECTED OUTCOMES
(Completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #13 Impact of Technology (Ways of Knowing)

Request for: ☐ **New Course**   ☐ **Course Change**   ☐ **Course Inactivation**   ☐ **Course recertification**
Evaluate as: ☐ **Skill**   ☐ **Ways of knowing**   ☐ **Writing intensive course**   ☐ **Requirement met in major***

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

Note: List and submit Part 2 and Part 3 attachments for all courses used to satisfy the requirement.

Describe how each expected outcome will be met by this course or attach completed matrix. Use as much space as necessary (table will expand).

Expected Outcome (#13 Impact of Technology)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Describe the use and development of a given technology as a human and cultured activity				

Expected Outcome (#13 Impact of Technology)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by _more than one_ course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Understand and describe the components, mechanisms, and function of a technological system, such as information and communication, finance, energy production, industrial production, food production, international trade, transportation, education, etc.				
Discuss the impact that a given technology may have on its users: how it may change users' conception of reality and what users' perceptions and biases are toward it				
Understand and describe the potential consequences, both intended and unintended, of a given technology for individuals, nations, societies, and the environment				

Expected Outcome (#13 Impact of Technology)	This section must be completed for all courses that are used to meet the requirement		Complete only if requirement is met by *more than one* course	
	Specific Course Content	**Instructional Activity/ Assignments/Testing**	**Specific Course(s)** *(SUBJ/CRSE#)*	**Weight** *(e.g., % of grade, # hrs of instr.)*
Express informed opinions about the cost/benefit relationship of a given technology, with considerations for development or controlled limitations				
Understand and describe how technology has enabled the pace of change and interdependency that have accelerated globalization				
Describe the role of technology in defining ideas of progress and modernism				
Attachments included:				

Old Dominion University
STANDARD SYLLABUS
(completed form with all attachments should be sent to Judy Bowman,
Office of Academic Affairs, 2020 Koch Hall or e-mail to jbowman@odu.edu)

General Education Requirement #_____

Request for: ☐ **New course** ☐ **Course change** ☐ **Course inactivation** ☐ **Course recertification**

Evaluate as: ☐ **Skill** ☐ **Ways of knowing** ☐ **Writing intensive course** ☐ **Requirement met in major***

Met by the following course(s) (list SUBJ/CRSE# and TITLE):

*List and submit Part 2 and Part 3 attachments for all courses that will be used to satisfy the requirement

Faculty Senate Undergraduate Curriculum Committee A asks that a standard syllabus outline be attached that will be the model for all sections of the course. The Committee understands that each instructor teaches a general education course with some unique materials and emphases. However, the Committee wants to be assured that the core objectives and outcomes are assessed no matter who teaches the course.

The faculty of the University, with the assistance of the Office of Institutional Research and Assessment, are responsible for demonstrating to SACS and SCHEV that ODU is meeting standards for measuring and assessing attainment of student learning outcomes. This might include: an identification of course learning outcomes, assignments, testing metrics, and a review process that results in curriculum improvement and enhanced student learning.

Please attach a standard syllabus that will be used for all sections of this course. If multiple courses will be used to satisfy the requirement, please attach a syllabus for each course listed above.

Essential elements to be included in syllabus

- Course description
- Course objectives/goals
- Currently required text(s)
- Currently required materials, supplies, and software
- Evaluation criteria for grading

Appendix H

State Council of Higher Education for Virginia
Policies, Procedures, Forms

State-Level Requirements for Approval of Various Academic Program Actions At Public Institutions

This process chart was developed by SCHEV staff as a reference guide for public institutions seeking state action on academic programs. ***Yellow shaded* actions require preparation of program proposals.** Non-shaded actions require submission of designated forms and narrative statements. SCHEV's "Policies and Procedures for Program Approvals and Changes" contains definitions of these terms, specific policy statements, detailed instructions, and links to all requisite forms.

Academic Program Action Sought by Institution	Council Approval	SCHEV Staff Approval	Action Reported to SCHEV	No Action Required at State Level
New Degree Program[1]	X			
Spin-Off Degree Program		X		
First Professional Degree[1]	X			
Health Program[1,2]	X			
Major, Concentration, Option, Emphasis, Focus or Track				X
Certificate			X[3]	
C.A.G.S. or Ed.S.[1]	X			
Program Merger		X[4,6]		
Degree Designation Change[1]		X[5]		
Program Title Change		X[5]		
CIP Code Change		X[5]		
Program Discontinuance		X[6]	X[6]	

[1] If a proposed academic program will elevate a public institution to a new degree level, then the institution must also seek approval to change its degree-level authority through the appropriate state procedures.

[2] §23-9.10:1 The State Council of Higher Education is hereby designated the planning and coordinating agency for all post-secondary educational programs for all health professions and occupations.

[3] For all certificate programs, submit the "Program Proposal" cover sheet and a requisite narrative statement.

[4] Submit the "Format for Merging Academic Programs" cover sheet and requisite narrative statement.

[5] Submit the "Format for Revising Academic Programs" cover sheet and requisite narrative statement.

[6] Submit the "Intent to Discontinue an Academic Program" cover sheet and requisite narrative. Action to remove a degree designation must be approved by SCHEV staff.

STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA
PROGRAM PROPOSAL COVER SHEET

1. Institution	2. Program action (Check one):
	     New program proposal _____
	     Spin-off proposal _____
	     Certificate proposal _____

3. Title of proposed program	4. CIP code
5. Degree designation	6. Term and year of initiation

7a. For a proposed spin-off, title and degree designation of existing degree program

7b. CIP code (existing program)

8. Term and year of first graduates	9. Date approved by Board of Visitors

10. For community colleges:
    date approved by local board
    date approved by State Board for Community Colleges

11. If collaborative or joint program, identify collaborating institution(s) and attach letter(s) of intent/support from corresponding chief academic officers(s)

12. Location of program within institution (complete for every level, as appropriate).

    Departments(s) or division of _____

    School(s) or college(s) of _____

    Campus(es) or off-campus site(s) _____

    Distance Delivery (web-based, satellite, etc.) _____

13. Name, title, telephone number, and e-mail address of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding this program proposal.

vi) **Summary of Projected Enrollments in Proposed Program**

   Complete and submit the form below.

   _____

STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA
SUMMARY OF PROJECTED ENROLLMENTS IN PROPOSED PROGRAM

Instructions:

- Enter the appropriate dates at the top of each column.

- Provide **fall headcount enrollment (HDCT)** and **annual full-time equivalent student (FTE) enrollment**. Round the FTE to the nearest whole number.

- Assumptions: Provide data for 1. Retention (%); 2. Part-time students (%); 3. Full-time students (%); 4. Expected time to graduation (in years) for full-time and part-time students; and 5. Number of credit hours per semester for full-time and part-time students.

Note: **Target Year** refers to the year the institution anticipates the program will have achieved full enrollment. The Council will review for possible closure any program that has not met SCHEV's productivity standards within five years of the date of first program graduates. Programs that do not anticipate meeting SCHEV productivity standards should not be proposed (see Productivity Standards). Productivity standards are not guidelines for student projected enrollment and should not be used to complete the chart below. Projected enrollment should represent actual plans for student enrollment in the program.

Projected enrollment:

Year 1		Year 2		Year 3		Year 4 **Target Year** **(2-year institutions)**			Year 5 **Target Year** **(4-year institutions)**		
20 - 20		20 - 20		20 - 20		20 - 20			20 - 20		
HDCT	FTES	HDCT	FTES	HDCT	FTES	HDCT	FTES	GRAD	HDCT	FTES	GRAD
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Note: VCCS institutions only complete Years 1 through 4. Graduation rates must be included in Year 4, Target year for the VCCS. Four-year institutions are not to complete the GRAD rate for Year 4.

Definitions:
HDCT—fall headcount enrollment
FTES—annual full-time equated student enrollment
GRADS—annual number of graduates of the proposed program

vi) Projected Resource Needs

Instructions:
- In a <u>narrative</u>, describe the available and additional program resources anticipated in each of the following categories, <u>explaining the need to operate the program</u>:

> full-time faculty   part-time faculty
> adjunct faculty   graduate assistants
> classified positions   targeted financial aid
> library   telecommunications
> space   equipment (including computers)
> other resources (specify)

- Describe all sources of funds and the anticipated effect of an reallocation of funds and faculty within the instructional unit.
- In addition to the above description, a narrative **must** be included to provide detailed explanation of the amount and sources of funds allocated and/or reallocated to support the proposed program.
- With the assistance of the institution's budget officer or chief financial officer, complete and attach the "form "<u>Projected Resource Needs for Proposed Program</u>." On that form:
  - answer the questions listed in Part A.
  - use the number of full-time equivalent (FTE) positions when completing the table in Part B.
  - in Part C, use 0% salary increases and no inflation factor for any other cost item.

_____

PROJECTED RESOURCE NEEDS FOR PROPOSED PROGRAM

Part A: Answer the following questions about general budget information.

- Has the institution submitted or will it submit   Yes_____ No_____
  an addendum budget request to cover one-time costs?

- Has the institution submitted or will it submit   Yes_____ No_____
  an addendum budget request to cover operating costs?

- Will there be any operating budget requests for this program   Yes_____ No_____
  that would exceed normal operating budget guidelines (for
  example, unusual faculty mix, faculty salaries, or resources)?

- Will each type of space for the proposed program be within   Yes_____ No_____
  projected guidelines?

- Will a capital outlay request in support of this program be   Yes_____ No_____
  forthcoming?

Part D: Certification Statement(s)

The institution will require additional state funding to initiate and sustain this program.

    __Yes _____

                         Signature of Chief Academic Officer

    __No _____

                         Signature of Chief Academic Officer

If "no," please complete Items 1, 2, and 3 below.

1. Estimated $$ and funding source to initiate and operate the program.

Funding Source	Program initiation year 20 - 20	Target enrollment year 20 - 20
Reallocation within the department *(Note below the impact this will have within the department.)*		
Reallocation within the school or college *(Note below the impact this will have within the school/college.)*		
Reallocation within the institution *(Note below the impact this will have within the institution.)*		
Other funding sources *(Specify and note if these are currently available or anticipated.)*		

2. Statement of Impact/Funding Source(s). A separate explanation is required for each source used. (click on the line to start typing)

_____
_____
_____
_____
_____

3. Secondary Certification.
If resources are reallocated from another unit to support this proposal, the institution will **not** subsequently request additional state funding to restore those resources for their original purpose.

    ____ Agree _____

                         Signature of Chief Academic Officer

    ____ Disagree _____

                         Signature of Chief Academic Officer

**FORMAT FOR REVISING ACADEMIC PROGRAM
TITLE, CIP CODE OR DEGREE DESIGNATION
COVER SHEET**

1. Institution	2. Program action (Check all that apply):
	    Change of program title _____
	    Change of CIP code_____
	    Change of degree designation_____

3. Title, existing program	
4. Degree designation, existing program	5. CIP code, existing program
6. Last term and year for granting existing degree	
7. New program title (if applicable)	
8. Degree designation, add ____ revised ____	9. CIP code, revised program
10. Term and year of initiation, revised program	11. Term and year of first graduates, revised program

12. Location of program within institution (complete for every level, as appropriate). If any organizational unit(s) will be new, identify the unit(s).
 	
  Department(s) of_____
 	
  Division(s) of_____
 	
  School(s) or colleges of_____
 	
  Campus (or off campus site)_____	

13. Name, title, and telephone number(s) of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding the revision.	

FORMAT FOR MERGING ACADEMIC PROGRAMS
COVER SHEET

1. Institution
2. Title, degree designation, and CIP code, existing program # 1
3. Title, degree designation, and CIP code, existing program # 2
4. Title, degree designation, and CIP code, all additional existing programs
5. If existing or merged programs are/will be collaborative or joint, identify collaborating institution(s) and attach letter(s) of support from corresponding chief academic officers(s)

6. Last term/year for granting existing degree	7. Title, merged program
8. Degree designation, merged program	9. CIP code, merged program
10. Term/year of initiation, merged program	11. Term/year of first graduates, merged program

12. Location of program within institution (please complete for every level, as appropriate). If any of these organizational units will be new, please so indicate. Department(s) of_____ Division(s) of_____ School(s) or colleges of_____ Campus (or off-campus site)_____
13. Name, title, and telephone number(s) of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding the merger.

SUMMARY OF PROJECTED ENROLLMENTS IN THE MERGED PROGRAM

Institution:_____   New program title:_____

CIP code:_____   Degree level:_____   Initiation date:_____

Instructions:
   Put the appropriate dates at the top of each column. Provide a **fall headcount** and an **annual FTE**. Round the FTE to the nearest whole number.

Part 1: Projected enrollment:

20 - 20		20 - 20		20 - 20	
HDCT	FTES	HDCT	FTES	HDCT	FTES
_____	_____	_____	_____	_____	_____

Part 2: Please check the student level(s) included in the figures above.

Undergraduate	**Graduate**
__ Lower occupational/technical	__ First year
__ Lower bachelor's	__Advanced
__Upper bachelor's	__ First professional

_____

PROJECTED FTE POSITIONS FOR THE MERGED PROGRAM

Complete the following table.

	Current FTE positions all programs to be merged 20 - 20	First year of merged program 20 - 20	Second year of merged program 20 - 20
Full-time faculty			
Part-time faculty			
Graduate assistants			
Classified positions			
TOTAL			

State Council of Higher Education for Virginia
INTENT TO DISCONTINUE AN ACADEMIC DEGREE PROGRAM
COVER SHEET

1. Institution	
2. Degree program title	
3. Degree designation	4. CIP code
5. Degree program approval date by Council	
6. Date beyond which no new enrollments will be accepted	7. Desired termination date for reporting degrees (semester and year)
8. For community colleges: local board discontinuance date	9. Board of Visitors or State Board for Community Colleges discontinuance date

10. **For Critical Shortage Area Only.** Check all that apply and explain.

⎯ Lack of student demand ⎯ Lack of market demand

⎯ State-wide public program duplication ⎯ Other (Please describe)

Explanation: _____

_____

_____

_____

List constituents impacted by action.

_____

_____

_____

11. If collaborative or joint program, identify collaborating institution(s). **Note**: Each collaborating institution must submit a separate "Intent to Discontinue" form.

12. Name, title, e-mail address, and telephone number(s) of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding the discontinuance.

State Council of Higher Education for Virginia
Virginia Public Higher Education Policy on Program Productivity

Effective October, 2013

I. Statutory Duties Related to Program Productivity Review at Public Institutions

The Code of Virginia §23-9.6:1, charges the State Council of Higher Education for Virginia (SCHEV) with various duties and accords Council the authority to carry out those duties.

Duty #6
- To review and require the discontinuance of any academic program which is presently offered by any public institution of higher education when the Council determines that such academic program is (i) nonproductive in terms of the number of degrees granted, the number of students served by the program, evidence of program effectiveness, or budgetary considerations, or (ii) supported by state funds and is unnecessarily duplicative of academic programs offered at other public institutions of higher education in the Commonwealth. As used herein, 'academic programs' includes both undergraduate and graduate programs (§23-9:6.1.6).

- The Council shall make a report to the Governor and the General Assembly with respect to the discontinuance of any academic program. No such discontinuance shall become effective until thirty days after the adjournment of the session of the General Assembly next following the filing of such report (§23-9:6.1.6).

Duty #15
- To adopt such rules and regulations as the Council believes necessary to implement all of the Council's duties and responsibilities as set forth in the Code. The various public institutions of higher education shall comply with such rules and regulations ((§23-9.6:1.15).

II. Principles Guiding Review of Program Productivity

Council executes its duty to review the productivity of academic degree programs in furtherance of its general responsibility "to promote the development and operation of an educationally and economically sound, vigorous, progressive, and coordinated system of higher education in the State of Virginia" (§23-9.3[a]). Accordingly, this policy and the process it governs seek to accomplish the following goals:

- to establish minimal quantitative standards for program productivity in terms of program enrollment and degrees granted;

- to prompt the rigorous institutional review of program productivity, which must include—but need not be limited to—the examination of programs in terms of the SCHEV quantitative standards;

- to utilize the program productivity review to promote the efficient use of resources, including—but not limited to—minimizing unnecessary duplication of academic programs;

- to account for relevant qualitative and mission-related factors in deciding the final disposition of programs under review.

III. Program Productivity Review Stages

SCHEV will review the productivity of academic degree programs at public institutions once every five years. The review will encompass all academic degree programs at all public institutions of higher education. For purposes of this review, Certificates of Advanced Graduate Study (CAGS) and Educational Specialist (Ed.S.) degrees will be treated as academic degree programs subject to review. Minors, concentrations, and the like will not be subject to review.

Associate degree programs are included in the SCHEV productivity review. Council has delegated to the State Board for Community Colleges the functional responsibility to review and discontinue any nonproductive community college associate degree programs. Quantitative standards applicable to associate degree programs are included in the appendix to this policy: "Virginia Community College System—Standards for Productivity Review of Associate Degree Programs." Associate degree standards specified there will also be applicable to relevant degree programs at Richard Bland College.

Stage 1   Following completion of the fifth year enrollment data collection, SCHEV will provide official notice to four-year public institutions and Richard Bland College of academic degree programs that fail to meet quantitative standards for FTE enrollment and number of graduates. Institutions will notify SCHEV promptly of any exemptions, data corrections, or data aggregation options that may be used to remove targeted programs from further review.

Stage 2   Each four-year institution and Richard Bland College will make a submission to SCHEV, which includes:

(i)   a report of all degree program discontinuances since the last program productivity review;

(ii)   notification via the "Institutional Action Form" provided in this policy, for each targeted program, whether the institution is
- discontinuing the program; or
- providing justification for continuing the program.

(iii)   *optional:* a description of institutional planning priorities and deliberative processes that have informed its overall approach to the review of program productivity.

The VCCS will report the results of its program productivity reviews and the totality of program discontinuances over the last five years.

Stage 3 SCHEV staff reviews institutional submissions. SCHEV may request additional information and/or meetings with institutions to discuss the overall implications of potential actions that may be taken with regard to targeted programs.

Stage 4 Following the review of all submissions, SCHEV staff will submit to Council recommendations for action. The final plan approved by Council will include a closure effective date for each program to be discontinued. It is anticipated that recommendations will be submitted at the March meeting and a final plan will be approved at the July meeting, although these targets are subject to modification.

Stage 5 Following Council's final action, SCHEV will submit a report on program discontinuances to the Governor and General Assembly, as per Code of Virginia §23- 9.6:1.

IV. Four-Year Institution Program Productivity Quantitative Standards

A. Formula for Graduates

([Student/faculty ratio] X [number of FTEF=2]) ÷ (number of years to complete the degree) = minimum # of graduates per year.

Variables:

Student/faculty ratio—derived from the base adequacy policy

Number of FTEF—two faculty FTE assumed per program

Number of years to complete the degree—baccalaureate (4); masters/professional (3); doctoral (5)

Illustrative Calculations:

Bachelor's degree in Business: 24 Students/Faculty X 2 FTEF ÷ 4 years = 12 graduates per year

Master's degree in Business: 11 Students/Faculty X 2 FTEF ÷ 3 years = 7 graduates per year

Doctorate in Business: 9 Students/Faculty X 2 FTEF ÷ 5 years = 4 graduates per year

Prof degree in Law: 17 Students/Faculty X 2 FTEF ÷ 3 years = 11 graduates per year

B. Formula for FTE enrollment

([Student/faculty ratio] X [number of FTEF=2]) = FTE enrollment.

C. Four-Year Institution Quantitative Standards by Discipline and Level

Discipline Groupings (as per Base Adequacy)	Baccalaureate		Master's/Prof		Doctoral	
	FTE	Grads	FTE	Grads	FTE	Grads
Group 1 Area Studies Business & Management Interdisciplinary Studies Library Science Military Science Public Affairs Social Sciences Study Abroad	48	12	22	7	18	4
Group 2 Communications Education Home Economics Letters Mathematics Psychology	40	10	20	7	16	3
Group 3a Agric & Natl Resources Architec & Env Design Computer/Information Sys Fine & Applied Arts Foreign Languages	36	9	18	6	14	3
Group 3b Biological Sciences Engineering Physical Sciences	36	9	16	5	12	2
Group 4 Health Professions[1]	24	6	14	5	10	2
Pharmacy	-	-	12	4	-	-
Other Law	-	-	34	11	-	-

[1] Excludes medicine, dentistry, and veterinary medicine

D. Utilization of Quantitative Standards in Program Productivity Review

Stage 1 of the program productivity review consists of SCHEV notifying institutions as to which programs have not satisfied both applicable standards (FTE and Grads) as specified in the table above. Upon receiving this notice, institutions should promptly review the information for targeted programs at the following link, http://research.schev.edu/productivity/default.asp, and report any apparent inaccuracies to SCHEV. If a data correction results in a program satisfying a previously failed quantitative standard, that program will be removed as a target of the productivity review. At this time, institutions should also notify SCHEV whether they wish to exercise any of the following options to remove eligible programs from further review:

- Five-Year Exemption. Any program that has been in existence for five or fewer years (i.e., since 2008-09) may be exempt from review, at request of the institution.

- Aggregating Data for Programs at the Same Level. For programs that offer more than one degree option in the same subject at the same level, SCHEV may consider aggregated data for all options at that level (e.g. BA/BS in Sociology, or MA/MFA in Music). Normally, this option will require that the aggregated programs have the same CIP code.

- Aggregating Data for Programs at the Master's and Doctoral Levels. For programs with the same CIP code that are offered at the master's and doctoral levels, data on enrollment and graduates may be combined to meet the applicable productivity standards. In such cases, aggregated data for the programs must satisfy the *aggregated productivity* standards for the programs in question.

V. Justification of Targeted Programs on Qualitative Grounds

If a targeted program is not eligible for the five-year exemption and "data aggregation" does not apply, the institution must submit a completed "Institutional Action Form," indicating whether it will discontinue the program or seek to justify its continuation. If seeking continuation, the institution must indicate which qualitative criteria apply to the program in question and submit supporting documentation for each criterion. Qualitative criteria are indicated on the Institutional Action Form. In general, in order for a proposed justification to be successful, the targeted program must receive a compelling defense in terms of mission centrality, efficient use of resources, quality, and institutional commitment. The specified qualitative criteria are intended to elicit a full range of factors according to which a compelling defense can be made. SCHEV may request additional information with regard to any particular targeted program or with regard to an institution's overall approach to program productivity review and program discontinuances.

Program Productivity Review: *Institutional Action Form*

Complete a separate form for each targeted program

1. Institution	
2. Program title	

3. CIP Code	4. Degree designation (e.g., AA, BS, MBA, PhD)	5. Date

Check one of the following to indicate action the situation will take concerning this program:

☐ Institution will close the program. Closure date: _____

☐ Institution seeks to justify continuation of the program on qualitative grounds and is submitting required documentation. *Proceed to "Program Justification" below.*

	Check if applies	Qualitative Criterion
1.		Program is central to the institution's mission. *(Provide justification.)*
2.		Program courses support general education and/or professional programs. *(Provide five-year average of FTE enrollments for lower- and upper-division courses taught by faculty dedicated to the program.)*
3.		Interdisciplinary program. *(Provide evidence that a majority of required courses in the curriculum are share with other degree programs.)*
4.		Program shares a substantial number of courses and faculty with other similar programs. *(Provide CIP codes for other programs and evidence of shared resources.)*
5.		Student or employer demand, or demand for intellectual property is high and external funding for research will be jeopardized by program closure. *(Provide evidence and cite sources of demand or funding.)*
6.		Program provides access to an underserved population or geographical area. *(Provide justification.)*
7.		Program meets a unique need in the region, Commonwealth, or nation. *(Provide justification.)*
8.		Program has performed well in objective external qualitative reviews. *(Provide excerpts from recent review[s] attesting to program quality.)*
9.		Institution has specific plans to bolster program performance and increase enrollment and graduates per year. *(Explain.)*
10.		Other *(Explain and provide justification.)*

VI. Staff Recommendations and Council Action

Following review of institutional submissions, staff will recommend actions to Council. Council action will generally be to continue or discontinue a targeted program. In certain exceptional cases, Council may place restrictions or ask for follow-up reports on a program that has been approved to continue.

In cases where an institution and SCHEV staff have not been able to come to agreement on a program or programs, the institution may request to appear before Council before final action is taken.

State Council of Higher Education for Virginia
Certificate Program Definitions

These certificate definitions were developed by SCHEV staff to guide public institutions in preparing submissions to SCHEV when instituting new certificate programs. Generally, any new certificate program should fall within the boundaries of one of the categories of certificate listed below.

Note: If it should be necessary—due to particular disciplinary, certification, or other requirements—to design a certificate program that departs from these parameters, the institutional submission should include an appropriate explanation and citation of applicable external standards.

Baccalaureate/undergraduate certificate
A program of study in which all course work is at the bachelor level. The required number of courses varies, with a minimum of 9 credit hours and a maximum of 18credit hours.

Post-baccalaureate certificate
A program of study designed to further undergraduate education that does not require enrollment in a graduate-level degree program. The required number of courses varies, with a minimum of 9 credit hours and a maximum of 15 credit hours of coursework beyond the bachelor's degree. The majority of required courses are at the graduate level with a limited number of courses at the upper division baccalaureate level. A prerequisite of a baccalaureate degree is required for admission.

Graduate Certificate
A program of study requiring graduate level coursework in a particular subject or area of specialization. The required number of courses varies, with a minimum of 12 credit hours and a maximum of 24 credit hours. A prerequisite of a baccalaureate degree is required for admission.

Post-Professional Certificate
A program of study in which the required number of courses varies, with a minimum of 12 credit hours and a maximum of 24 credit hours of graduate level coursework. A prerequisite of a baccalaureate degree or master's degree and licensure or national certification in a professional field is required for admission.

Certificate of Advanced Graduate Study (CAGS)
A program of study that is intermediate between the master's and doctorate level. The required number of courses varies depending on the discipline and coursework consists of advanced graduate study. A prerequisite of a master's degree is required for admission.

Note: Graduate certificate programs requiring more than 24 credit hours will be reviewed to determine whether the program of study is a certificate of advanced graduate study (CAGS).

June 6, 2014

Appendix I
Example of Successful Undergraduate Program
Through Internal and External Processes
Program Launched 2009

PROGRAM PROPOSAL COVER SHEET

1. Institution
Old Dominion University
	2. Program action (Check one):
	    Spin-off proposal _____
	    New program proposal **X**__

3. Title of proposed program **Modeling and Simulation Engineering (M&SE)** Note: This documentation represents a close proximity to that submitted to SCHEV.	CIP code: 14.0101
5. Degree designation **BS – M&SE**	6. Term and year of initiation **Fall 2009**
7. Term and year of first graduates **Spring 2012**	8. For community colleges: date approved by local Board Not Applicable
9. Date approved by Board of Visitors	10. For community colleges: date approved by State Board for Community Colleges Not Applicable

11. If collaborative or joint program, identify collaborating institution(s) and attach letter(s) of intent/support from corresponding chief academic officers(s)
  Not Applicable

12. Location of program within institution (complete for every level, as appropriate). If any organizational unit(s) will be new, identify unit(s) and attach a revised organizational chart and a letter requesting an organizational change (see Organizational Changes--*hotlink*).

  College **Frank Batten College of Engineering and Technology**

  Campus **Norfolk Campus**

  Distance Delivery (web-based, satellite, etc.) Not Applicable

13. Name, title, telephone number, and e-mail address of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding this program proposal.

  Dr. Charles E. Wilson, Vice Provost for Undergraduate Studies
      Phone: 757-683-3259   E-Mail: cwilson@odu.edu

New Undergraduate Program Proposal

MODELING AND SIMULATION ENGINEERING

Batten College of Engineering and Technology
Old Dominion University
Draft v3.2

Table of Contents

New Undergraduate Program Proposal

MODELING AND SIMULATION ENGINEERING

Batten College of Engineering and Technology
Old Dominion University
Draft v3.2

I. INTRODUCTION

The Batten College of Engineering and Technology (BCET) of Old Dominion University is pleased to submit this formal proposal for the development of a new Bachelor of Science Degree Program titled Modeling and Simulation Engineering (M&SE). The purpose of this document is to describe the proposed M&SE program in sufficient detail to facilitate review by Old Dominion University and its Board of Visitors, and the State Council for Higher Education in Virginia (SCHEV).

A major component of the mission of Old Dominion University is to respond to the advanced educational and workforce development needs of the Hampton Roads region and the Commonwealth of Virginia. Over the past ten years, modeling and simulation has emerged as one of this region's principal technology sectors. With an expanded workforce, it is likely that this activity will grow at a dramatic rate. We have the potential in Hampton Roads to lead the world in modeling and simulation. The missing component in the educational path needed to expand the M&S workforce is the presence of an undergraduate modeling and simulation program. Because of past investments in M&S research and graduate education, Old Dominion University is well positioned to quickly and efficiently initiate such a program. Old Dominion University will benefit directly through ownership of a program capable of attracting highly qualified new students and in demonstrating once again an ability to respond quickly and decisively to community need.   The University will benefit indirectly through a strengthening of its reputation of being a leader in M&S education and research.

The proposed M&SE program is designed to be an undergraduate engineering degree program accredited by ABET.[2] The curriculum and supporting infrastructure meet or exceed the ABET requirements for a General Engineering program. The content of the program consists of topics generally representative of the broad areas of engineering and science. Thus, primary program sponsorship will be provided by the Batten College of Engineering and Technology, the College of Sciences, and the Virginia Modeling, Analysis and Simulation Center (VMASC). The program also will incorporate M&S components from all six academic colleges at Old Dominion University. We believe this will be the world's first ABET accredited undergraduate program in modeling and simulation.

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[2] ABET, Inc., 111 Market Pl., Suite 1050, Baltimore, MD 21202 (formerly Accreditation Board for Engineering and Technology)

When approved by SCHEV, the M&SE program will be initiated over a three-year period. The freshman and sophomore years of the program will be implemented in Academic Year 2009-2010, the junior year in Academic Year 2010-2011 and the senior year in Academic Year 2011-2012. The first program degrees will be granted in May 2012; the first program accreditation visit will follow in fall 2012. It is estimated that the program will take another two years to reach targeted steady-state. By Academic Year 2014-2015, we anticipate an FTE enrollment (sophomores through seniors) of 110 students and the production of 25-30 bachelor's degrees annually.

The proposal is organized in five sections. In Section II, a brief introduction to the background and motivation supporting the development of this proposal is presented. Old Dominion University, Hampton Roads, and the Commonwealth of Virginia already are invested heavily in modeling and simulation. An understanding of this investment is important to provide context for this program proposal. In Section III, a detailed description of the proposed M&SE program is given. Areas considered include program organization, curriculum, student management, assessment, and required infrastructure. Justification for the program is presented in Section IV. This discussion includes a needs assessment, detailed enrollment projections, and documentation of support for the program by local industry and government organizations. Finally, the resources necessary to initiate and then sustain the program are described in Section V.

II. BACKGROUND AND MOTIVATION

The Discipline of M&S

The following discussion serves to define modeling and simulation as used in the context of this proposal. A model is a physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process. It is used as a stand-in for the real thing and often facilitates the quantitative investigation of behavior. A simulation is a methodology for extracting information from a model by observing the behavior of the model as it is executed. For our purposes, the model is expressed in computer code and model behavior is obtained by running that code on a digital computer. Modeling and simulation refers to the process of developing a logical model and then applying computer simulation to extract information concerning that model. For many real-world systems that are characterized as being complex, modeling and simulation often is the only practical method available to study system behavior.

In addition to formulating models and conducting simulations, the modeling and simulation process includes a number of other important activities. Data must be collected and processed in order to provide the information necessary to drive the simulation process. Computer visualization often is used to help interpret and understand the large volume of data produced during a simulation run. Analysis must be conducted to define the set of simulation experiments required for an investigation and to manipulate the resulting output data to produce the desired performance

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information. Tests must be conducted to prove that the behavior exhibited by a model is sufficiently close to the behavior of the real system so that simulation results can be considered representative and meaningful. These basic activities are common to all modeling and simulation studies and are independent of the nature or type of system being investigated. The knowledge necessary to conduct these modeling and simulation activities comes from the disciplines of mathematics, statistics, computer science, computer engineering, systems engineering and operations research. It is unreasonable to expect any single individual to have knowledge spanning the entirety of all of these disciplines. The primary purpose of the proposed M&SE program is to selectively collect from these disciplines those components necessary to the process of modeling and simulation. It is this subject content that forms the core course content of the M&SE program.

When applying modeling and simulation to the investigation of a specific system, a knowledge and understanding of the workings of that system are required to formulate a model and to interpret the output data obtained from simulating that model. This knowledge is called domain knowledge. Domain knowledge is specific to the system being investigated and is derived from the disciplines to which that system belongs. For example, industrial engineers and mechanical engineers might be required to model the operation of a factory floor, biologists and organic chemists might be required to model cell mutation in the presence of pollutants, and psychologists and sociologists might be required to model crowd behavior during a crisis. Individuals having domain knowledge for a specific class of systems are called subject matter experts (SME's). While no single individual can develop a detailed knowledge in many system classes, it is beneficial to develop this detailed knowledge in at least one M&S application area. The proposed M&SE program requires students to complete a minor in some M&S application area. This requirement is important for two reasons. First, it means that each student will gain an appreciation for the role that SME's play in the M&S process. Second, it provides each M&SE student an opportunity to investigate at some depth at least one other academic discipline where M&S is used as a support tool. As an added benefit, the minor requirement also presents the opportunity for other university programs to participate in the M&SE program.

M&S in Hampton Roads

Since the 1960's, modeling and simulation has been one of the standard analysis tools used in engineering and science. Analysis refers to the investigation of the behavior of a model under conditions within or at the design boundaries for that model. With modeling and simulation, the behavior of a system can be investigated under a variety of operating conditions quickly and efficiently. In Hampton Roads, Northrop Grumman – Newport News Shipbuilding has long used simulation for the design of surface ships and submarines. NASA Langley Research Center has used simulation in the analysis, design, and evaluation of aircraft and space vehicles.

In the 1980's and 1990's, advances made in the capabilities of computers and the introduction of powerful desktop computers made practical the use of simulation for experimentation and training. Experimentation refers to the investigation of the

behavior of a model under conditions that exceed the design boundaries of the model; training refers to the development of skills or knowledge required by individuals to operate or maintain the system represented by the model. In 1995, the United States Atlantic Command (USACOM), now the United States Joint Forces Command (USJFCOM), opened the Joint Training, Analysis and Simulation Center (JTASC) in Suffolk, Virginia. USJFCOM has the responsibility to train nearly 80% of this nation's military in joint operations. Historically, this training was done using live training exercises costing tens or hundreds of millions of dollars. The initial activities at JTASC were to develop simulation-based training techniques that could reduce the requirement for and cost of live training exercises. Today, the Joint War Fighting Center (JWFC) component of JTASC routinely conducts simulation-based exercises combining live, virtual, and constructive simulations into an integrated training environment at a small fraction of the cost of live exercises. All joint taskforce command personnel are required to visit JWFC to participate in this joint training.

In the late 1990's, the Joint Battle Lab (JBL), now the Joint Battle Center (JBC) was added to JTASC. The JBC uses simulation for experimentation. Proposed weapons systems are tested and evaluated to prove their value before funds are committed to the actual construction and deployment of these systems. New strategies and doctrine are tested through simulation before being adopted and used in actual warfare.

Today, Hampton Roads has become this nation's center for the military application of modeling and simulation. As described above, Hampton Roads is home to the Joint War Fighting Center (JWFC) and the Joint Battle Center (JBC), co-located in the US Joint Forces Command's Joint Training, Analysis and Simulation Center (JTASC) located in Suffolk. The US Army's Training and Doctrine Command (TRADOC) and the Military Traffic Management Command – Transportation Engineering Agency (MTMCTEA) are located in Newport News, and the Joint Forces Staff College is located in Norfolk. In addition, numerous US Navy operational commands are present including the Commander Operational Test and Evaluation Force (COMOPTEVFOR) located in Norfolk, the Naval Sea Systems Command – Dam Neck (NAVSEA-Dam Neck) located in Virginia Beach, and the Space and Naval Warfare Center – Little Creek (SPAWAR-Little Creek) located in Norfolk. These military commands utilize modeling and simulation extensively to develop doctrine, test and evaluate doctrine and equipment, and train military personnel. A host of companies and businesses operate offices and laboratory facilities in southeastern Virginia to support the military's requirements for modeling and simulation. In calendar year 2004, the economic value of modeling and simulation related business activity in Hampton Roads was estimated to be nearly $500M.

The use of modeling and simulation now is beginning to expand beyond engineering and military applications. Sixteen local companies and Old Dominion University have formed a partnership called the Emergency Management Training, Analysis and Simulation Center (EMTASC). EMTASC utilizes modeling and simulation to test and evaluate regional and state emergency preparedness plans and to train the command and management staffs that operate emergency operations centers. Old Dominion University and Eastern Virginia Medical School have joined forces to investigate the use of simulation-based training environments for medical students and health practitioners.

NASA Langley Research Center, Old Dominion University, and area school systems are investigating the use of simulation-based instructional techniques and instructional gaming to enhance science, technology, engineering, and math (STEM) education. And the Commonwealth of Virginia, in consultation with several state universities including Old Dominion University, are utilizing simulation to investigate solutions to serious and long-standing transportation problems. By calendar year 2009, the economic value of the modeling and simulation industry in Hampton Roads is expected to exceed $750M. This dramatic economic growth requires the availability of a trained and highly skilled M&S workforce.

A collective goal of local educational organizations is to provide an educational path in M&S that begins at the high school level and progresses seamlessly to the doctoral level. Students interested in careers in M&S are able to initiate their education at a level appropriate to their academic preparation and experience. They are able to move up the M&S educational path to the level necessary to acquire their next desired job. Many individuals will enter and exit this path several times over the course of their careers. Such a workforce development educational path is essential to continually provide the high-tech workforce needed in M&S. Currently, the Virginia Beach City Public Schools are offering a one-year program in M&S. Tidewater Community College (TCC) and Thomas Nelson Community College (TNCC) have implemented programs to train M&S support technicians and are preparing to initiate Associate of Applied Science (A.A.S.) and Associate of Science(A.S.) degree programs in M&S. Old Dominion University offers master's and doctoral programs in M&S. It is apparent that the weak link in the workforce development educational path occurs at the Bachelor's Degree level. Development of an undergraduate program in M&S would complete the M&S educational path, produce entry-level engineers desperately needed by local M&S industry, and provide the feedstock necessary to grow the M&S Graduate Programs. This is the primary motivation driving the development of a Bachelor's Degree Program in Modeling and Simulation Engineering at Old Dominion University.

Old Dominion University's Role in M&S

Recognizing the significance of the modeling and simulation enterprise in Hampton Roads and the need to provide an academic infrastructure to support this activity, Old Dominion University began to plan and solicit support for research and graduate programs in modeling and simulation during spring 1995. In October 1996, Old Dominion University entered into a Cooperative Research and Development Agreement (CRADA) with the US Joint Forces Command. This CRADA, coupled with special funding from the Commonwealth of Virginia, facilitated the establishment of the Virginia Modeling, Analysis and Simulation Center (VMASC) on July 1, 1997. This was followed quickly by the development of formal degree programs in modeling and simulation, a master's degree program in fall 1998 and a doctoral degree program in spring 2000.

VMASC is organized as a research and development center within the Office of Research at Old Dominion University. VMASC has the goal of promoting Hampton Roads and Virginia as a recognized center for modeling and simulation. The Center actively seeks collaboration and partnership with other organizations representing

academia, government and industry through VMASC membership. VMASC members include all doctoral-granting universities in Virginia, organizations representing all branches of the military, state and local economic development agencies, and approximately 50 dues-paying industrial members. The mission of VMASC has four components: research, to develop new knowledge and technologies for modeling, simulation, and visualization; economic development, to expand modeling and simulation business activity in Virginia; education, to increase the number of qualified modeling and simulation professionals available in the workforce; and technical support, to assist the military and industry in the application of modeling and simulation technology. The main VMASC facility is located in Suffolk in close proximity to the Joint Training, Analysis and Simulation Center. The 60,000 square foot facility includes simulation development laboratories, a multimedia-equipped conference room, administrative and staff offices, and the VMASC Battle Lab. VMASC also operates a Visualization Laboratory and CAVE facility located on Old Dominion University's Norfolk Campus. These facilities are located in the recently completed Engineering and Computational Sciences Building.

The research activities of VMASC are focused on the areas of modeling, simulation, and visualization. Research interests and capabilities of VMASC include simulation methodologies, mathematical modeling, verification and validation, distributed simulation, computer visualization, immersive virtual environments, human-machine interfaces, human behavior modeling, intelligent systems, decision support and collaboration methodologies, and M&S systems integration. These capabilities are applied to problems in diverse application domains including military and homeland security, medicine and bio-science, education and gaming, transportation, and engineering and science. The Center's primary research customer is the United States Department of Defense that supports research projects in war-gaming, simulation-based training, information systems, and simulation-based testing, evaluation and analysis. The economic development activities of VMASC are directed at expanding the application of modeling and simulation; the Center is especially cognizant of opportunities to transfer modeling and simulation technology and know-how between the military and commercial sectors. During the past several years, VMASC has conducted approximately forty research and development projects per year, often with the participation of one or more of the VMASC members. Research expenditures are approximately $9M per year.

III. PROGRAM DESCRIPTION

In this section, a detailed description of the proposed Bachelor of Science Degree Program in Modeling and Simulation Engineering is presented. The M&SE program is designed to be an undergraduate engineering program accredited by ABET. The program is open to students who have earned a college-preparatory high school diploma or an Associate of Science degree in Engineering or Science at a community college or junior college, and who meet Old Dominion University's engineering admission requirements. Graduates of the M&SE program will be prepared to enter the workforce as entry-level M&S engineers or scientists. In addition, graduates will be

prepared to enter graduate study in modeling and simulation and, with appropriate use of elective freedom, other disciplines where M&S has application. Program graduates will be prepared to seek certification as a Certified Modeling and Simulation Professional (CMSP) and as an Engineer in Training (EIT).

Objectives and Outcomes

The program objectives of the M&SE program are:

(1) to provide the fundamental knowledge and skills of modeling and simulation engineering necessary for our graduates to conduct successful and rewarding professional careers, to participate in and benefit from life-long learning opportunities, and to pursue graduate-level education;

(2) to provide the knowledge and skills necessary for our graduates to organize, communicate, and present their ideas appropriately and effectively;

(3) to provide the knowledge and skills necessary for our graduates to function effectively in professional organizations and to understand the issues arising in professional practice including teamwork, ethics, leadership, responsibility, and safety; and

(4) to prepare our graduates to propose innovative solutions to the challenging technical problems facing society and to be prepared to take leadership positions in the realization of these solutions.

The M&SE Program must be designed to have an educational process to produce a set of outcomes that foster the attainment of the program objectives and an assessment process that measures the degree to which the outcomes are achieved. The results of this assessment then must be applied to the further development of the program.

The desired program outcomes for the M&SE Program are presented in the following.

M&SE graduates must demonstrate an ability to:

(1) apply knowledge of mathematics, science, and engineering;

(2) design and conduct experiments, as well as to analyze and interpret data;

(3) design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;

(4) function on multi-disciplinary teams;

(5) identify, formulate, and solve modeling and simulation engineering problems;

(6) understand professional and ethical responsibility;

(7) communicate effectively in writing and speaking;

(8) understand the impact of engineering solutions in a global, economic, environmental, and societal context;

(9) recognize the need for, and possess the ability to engage in, life-long learning;

(10) acquire a knowledge of contemporary issues; and

(11) utilize the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Curriculum

The courses that constitute the M&SE curriculum must be selected carefully to meet a number of program guidelines and requirements. These guidelines and requirements include the following.

Program Objectives and Outcomes. The M&SE curriculum is the principle means through which the students acquire the skills, knowledge, and behaviors embodied in the program outcomes and objectives. The curriculum must be designed carefully to produce these program outcomes and to achieve the program objectives.

ABET Professional Component. ABET professional component requirements specify subject areas appropriate to modeling and simulation engineering but do not prescribe specific courses. The professional component must include:

(a) one year of a combination of college level mathematics and basic sciences, some with experimental experience, appropriate to the discipline;

(b) one and one-half years of engineering topics consisting of engineering sciences and engineering design appropriate to the student's field of study;

(c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives; and

(d) a culminating design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

M&S Body of Knowledge. Various professional organizations and groups have developed body of knowledge documents that identify the major topic content components important to the modeling and simulation discipline. While there is some variation in recommended content, the following content components are identified as being important for a reasonably broad exposure to modeling and simulation: M&S

paradigms including Monte Carlo simulation, discrete event simulation, and continuous simulation; M&S methodologies including real-time simulation, system dynamics, finite element modeling, and agent-based simulation; related areas of study including probability and statistics, mathematical modeling, analysis and operations research, computer graphics and visualization, human factors and human behavior modeling, project management, and artificial intelligence; verification and validation; distributed simulation; and interoperability. It is important that the curriculum cover most of these major M&S content components.

Engineering Common Freshman Year. Old Dominion University's engineering programs are designed to have a common freshman-year curriculum. This presents the student with team-conducted and project-based learning, and an opportunity to learn about the various engineering disciplines before having to choose a major. The M&SE curriculum should incorporate this common freshman-year curriculum.

Community College Interface. The A.S. Degree Program in Engineering at Virginia's community colleges has been designed to be compatible with Old Dominion University's engineering programs. With appropriate selection of allowed courses, a student is able to transfer an A.S. Degree program to satisfy the first two years of an Old Dominion engineering degree. The M&SE program should be structured to facilitate compatibility with community college programs.

A showcase curriculum that satisfies all of the identified constraints and guidelines has been developed for the M&SE program. The content breakdown of this curriculum is shown in Table A.1 in Appendix A.. The curriculum consists of 32 credits of mathematics and basic sciences, 48 credits of M&SE core science and engineering, 37 credits of general education content, and 11 credits of additional course content for a total of 128 credits. It should be noted that in addition to the general education courses shown in the table, some of the courses from the mathematics and basic sciences area and the M&SE core science and engineering area also are required to satisfy the Old Dominion University General Education requirements. It is permissible to replace chemistry with biology for those students interested in bio-science and medical applications of modeling and simulation.

A more detailed view of the M&SE curriculum is shown in Table A.2. In this display, content requirements are translated into specific course requirements and the courses are scheduled over an eight-semester period. This display also shows the prerequisites for each course.

Catalog descriptions for the core M&SE courses are presented in Appendix A. Courses having prefixes other than MSIM are existing courses offered as part of existing undergraduate degree programs. Courses having an MSIM prefix are new courses that must be developed to support the proposed M&SE program. Eight lecture courses, two lecture/laboratory courses, and three laboratory courses will need to be developed.

An important component of the M&SE program is the requirement that students complete a minor in another academic program where M&S is used as a support tool. A list of potential minors is presented in Table A.3 in Appendix A. Many of the minors

identified in this table already are in place. However, in most cases one or more M&S related courses will need to be developed and then added to the minor requirements to give the minor more relevance to the M&SE program. Over time, it is anticipated that additional academic programs will establish minors appropriate to the M&SE program.

Program Organization

Old Dominion University already has made a very large investment in establishing M&S research and instructional programs. As described in Section II, an M&S graduate program has been established in the Batten College of Engineering and Technology, and graduate certificate programs are expected to develop in several of the other colleges in the near future. In addition, the University has established VMASC, an internationally recognized M&S research center. The organizational model selected for these activities is a multidisciplinary model. The M&S faculty are distributed across all six academic colleges, yet participate jointly to support VMASC research and the BCET graduate program. This model was selected to accentuate the belief that M&S has application in many other academic disciplines. This same approach will be applied to the organization of the undergraduate M&SE program. In this section, the proposed organization of the M&SE program is described.

Program Administration. The M&SE program will be accredited as an engineering program and will grant an engineering degree. Thus, the program will be administered through the Batten College of Engineering and Technology (BCET). The College of Sciences (CoS) and VMASC, in addition to BCET, will jointly provide most of the faculty and facilities required to operate the M&SE program. Thus, the organizational model must allow for all three units to participate in the administration of the program.

It is proposed that the M&SE program be administered by an Undergraduate Program Director (UPD) who reports to the Dean of BCET. This individual will be a senior M&S faculty member from BCET who is assigned part-time to the administration of the M&SE program. An M&SE Undergraduate Program Committee will be established to assist and advise the UPD. This committee will consist of one representation from each of the principle supporting units, CoS, VMASC, and BCET, and will be chaired by the UPD.

The Committee will recommend changes concerning program policy and process, oversee the curriculum, and assist with some operational activities such as assessment and course/faculty scheduling. When issues that cross college boundaries cannot be resolved at the program/college level, coordination will be provided by the Office of the Provost and VP for Academic Affairs. This is the same organizational model currently used successfully to administer the M&S Graduate Program.

The M&SE program will assume only some of the responsibilities normally attributed to a department. The Program will establish and maintain the M&SE curriculum. It will schedule and monitor program course offerings. The Program will recruit and admit students, advise accepted students, and then certify for graduation students who successfully complete the program. On the other hand, the M&SE program will not assume many of the other responsibilities of a department. The Program will not have

oversight responsibility for faculty. The M&S faculty will reside in a number of academic departments across the University and will be administered by those departments. The program will not administer budgets. While some operating funds will be required, the administration of those funds will be done within the Dean's Office of BCET. The Program will not have oversight responsibility for the research of the M&S faculty. That responsibility again will reside in the faculty's home department.

Faculty. Old Dominion University has become one of the international leaders in modeling and simulation research and graduate instruction over the past ten years. VMASC has a staff of approximately 40 and conducts nearly $9M in funded research and development activities each year. The Engineering M&S Graduate Program enrolls approximately 70 master's students and 60 doctoral students. The University has assembled an exceptionally strong faculty consisting of more than 30 participants to support these programs and activities. A listing of M&S affiliated faculty for academic year 2008-2009 is presented in Appendix B.

The 39 faculty identified in Appendix B can be categorized into three groups. The first and largest group consists of 25 self-select faculty members who have chosen to work with VMASC and the Engineering M&S Graduate Program because they have expertise and interests in M&S. These faculty collectively represent all six academic colleges and nearly a dozen academic departments. The majority of this group (17 of 25) view themselves as primarily users of M&S, while the remainder (8 of 25) have interests and expertise in the fundamentals of M&S. The second group, consisting of 7 faculty members, have been recruited over the past two years using newly acquired state funds provided for that purpose. These faculty have expertise and academic appointments in traditional academic programs, but are designated as M&S faculty within those programs. They were selected because they are users of M&S within their respective disciplines. They are charged with developing M&S application courses and conducting research having relevance to VMASC. The third group of faculty, consisting of 7 faculty members, are Ph.D.-qualified research and/or adjunct faculty supporting VMASC activities. Their primary role is to conduct funded research. Their secondary role is to mentor graduate students associated with their research activity. Many faculty in this group also teach one course each year primarily to help students develop the research skills needed to participate in the faculty's research area. Thus, the University already has an M&S faculty possessing the range of expertise required to initiate and operate the M&SE program.

Student Management

The M&SE program will utilize student management procedures similar to the other undergraduate engineering programs in the Batten College of Engineering and Technology. The procedures for freshman admissions, transfer student admissions, and student advising are described briefly in this section.

Freshman Admissions. The Old Dominion University Office of Admissions is responsible for evaluating and admitting freshmen. Admission decisions are made on the basis of high school performance, references, and SAT scores. All incoming

freshmen are admitted to the Engineering Fundamentals Division. Based on their SAT quantitative scores, students are placed appropriately into the calculus sequence. Those students not prepared for MATH 211 – Calculus I are placed in remedial courses such as MATH 162 – Pre-Calculus I or MATH 163 – Pre-Calculus II. All students are required to take an English placement examination. Those students who pass are eligible to take ENGL 110 – English Composition. Those students not prepared for ENGL 110 are required to take remedial courses.

When students have completed 30 credits, including ENGL 110 – English Composition, ENGN 110 – Exploring Engineering and Technology I, ENGN 111 – Exploring Engineering and Technology II, MATH 211 – Calculus I, MATH 212 – Calculus II, CS 150 – Problem Solving and Programming I, and PHYS 231N – University Physics I, and have earned a GPA of 2.00 or better in all courses completed, they are eligible for admission to the M&SE program.

Transfer Student Admissions. The Old Dominion University Office of Admissions is responsible for evaluating and admitting transfer students. The transfer applicant must have an overall GPA of 2.20 or better and be in good academic standing at an accredited institution for acceptance to Old Dominion University. The Office of Admissions also performs the initial transfer credit evaluation. Credit is transferred only for courses that have a close equivalent at Old Dominion University and when the student has earned a grade of "C" or better. For non-engineering and pre-engineering courses, the Office of Admissions utilizes a list of equivalent courses that was developed over time working in conjunction with universities offering courses similar to those at Old Dominion University. The M&SE program is responsible for reviewing and transferring credit for engineering courses. Transfer evaluation is based on a careful review of the course description, the course syllabus, and the course textbook. Courses are transferred only if they were taken from an ABET-accredited program or from a community college program with whom the University has a current articulation agreement.

It is anticipated that the majority of transfer students will come from the Virginia Community College System after completing an Associate of Science (A.S.) degree program in pre-engineering. The A.S. Degree satisfies all lower-division general education requirements as well as the pre-engineering course requirements. As with other transfer students, A.S. Degree students must have an overall GPA of 2.20 or better to be eligible for transfer.

Old Dominion University already has started consulting with Tidewater Community College and Thomas Nelson Community College concerning the development of two-year A.S. Degree Programs in Modeling and Simulation Engineering. A draft version of an articulation agreement for the M&SE program, consistent with the agreements for other engineering programs at Old Dominion University, has been developed. This draft is presented in Appendix C.

Part-Time Students. The proposed degree program can be completed through part-time study. A program of study tailored to the individual needs of the part-time students

will be designed by their faculty advisor. Part-time students must take all their courses in proper sequence to satisfy the pre-requisite course requirements.

Program Assessment

ABET has developed very detailed program assessment requirements for accredited engineering programs. Assessment of student learning is a critical component of the assessment process. Each engineering program for which an institution seeks accreditation or re-accreditation must have in place:

> (a) detailed published educational objectives that are consistent with the mission of the institution and the ABET criteria;

> (b) a process, based on the needs of the program's various constituencies, in which the objectives are determined and periodically evaluated;

> (c) an educational program including a curriculum that prepares students to attain program outcomes and that fosters accomplishments of graduates that are consistent with these objectives; and

> (d) a process of ongoing evaluation of the extent to which these program outcomes and objectives are attained, the result of which shall be used to enhance and improve the program courses and overall curriculum so that graduates are better prepared to attain the objectives.

The proposed M&SE program will utilize the continuous improvement assessment process shown in Figure 1. Using various assessment instruments described below, the Program will gather and analyze data describing the level of success in achieving the program outcomes. Program faculty will meet annually to identify program improvement strategies and actions that are likely to lead to enhanced performance. These actions will be implemented through curriculum changes and program adjustments that lead to increased success in achieving the program outcomes.

The following assessment instruments will be developed to gather data indicating the level of success in achieving the program outcomes.

Direct Assessment of Student Work. A faculty course evaluation form will be developed for each core M&SE course. At the conclusion of each semester, the faculty instructor for each course will be asked to assess the degree to which the program outcomes related to that course are achieved. This assessment will be quantitative, based on observed student performance on homework, class projects, and exams.

Student Exit Surveys. At the end of each semester, the graduating seniors will be asked to evaluate the overall M&SE program. A form will be developed to record student responses indicating the degree to which they feel the program outcomes have been achieved.

Alumni Survey. M&SE program alumni will be surveyed at two years and five years after graduation. They will be asked to indicate their assessment concerning the degree to which the program outcomes were achieved and the relevance of these outcomes to their work situation. They also will be asked to indicate their career advancement and salary history.
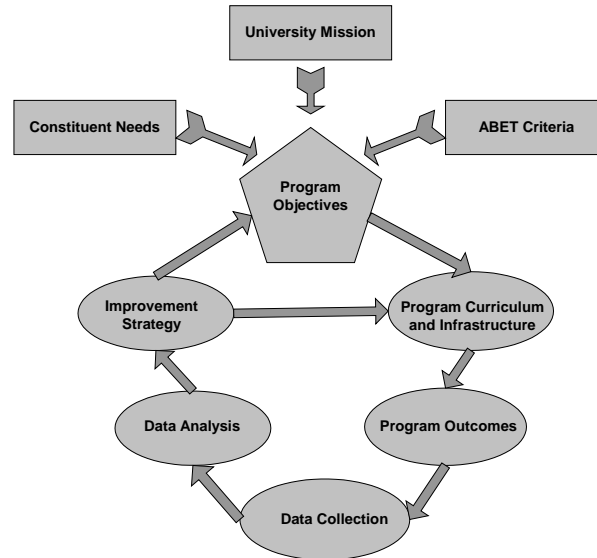
Figure 1. M&SE Continuous Improvement Assessment Process.

Cooperative Education Evaluations. Cooperative education students and employers will be asked to assess the degree to which program outcomes have been achieved based on observed job performance of the co-op students. They also will be asked to evaluate the relevance of each program outcome to their unique environment.

Employer Survey. On alternate years, selected employers of M&SE program graduates will be asked to assess the performance of the program graduates. This assessment will focus on the degree to which the program outcomes have been achieved based on observed job performance.

Industrial Advisory Board Review. The M&SE program will establish an Industrial Advisory Board. The members of this board will be technical managers in regional industries and organizations that utilize modeling and simulation. The Industrial Advisory Board will be asked periodically to help review program objectives and outcomes. The purpose of this component of the review process is to keep program objectives and outcomes current and relevant to the practice of modeling and simulation engineering.

This continuous improvement assessment process is very similar to assessment models used in Old Dominion University's other undergraduate engineering programs. The process has proven to be very effective as a means to regularly review and improve the educational process. The review cycle is two years.

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The metrics adopted to measure the achievement of the program objectives and outcomes are as follows:

- Direct assessment of student work will demonstrate that for each outcome the performance of at least 85% of the students is satisfactory or better.

- At least 85% of the students participating in the exit surveys will indicate that they have developed the abilities to achieve each of the program outcomes.

- At least 85% of the alumni participating in the alumni survey will indicate that the program outcomes and objectives are achieved at a satisfactory or higher level.

- At least 85% of the employers participating in the employer surveys will indicate that the program objectives are achieved at a satisfactory or higher level.

Additional Success Benchmarks

It is important to be able to monitor the M&SE program during its startup period to be sure that the program is being implemented successfully and as planned. The following performance measures are proposed as success benchmarks in addition to the metrics discussed in the preceding section to measure specifically how the program objectives and outcomes are achieved.

Performance measures to be reviewed every two years.

- Program enrollment numbers will track the estimates presented in Table 3.

- The number of the program graduates will track the estimates presented in Table 3.

- At least 85% of the students participating in the exit surveys/interviews will indicate that they are satisfied or very satisfied with the program.

- At least 85% of the alumni participating in the alumni surveys will indicate that they were adequately prepared for engineering practice and/or graduate studies.

- At least 85% of the employers participating in the employer surveys will indicate that they are satisfied or very satisfied with the overall performance of the program graduates they employ.

- At least 85% of program graduates will find M&S related employment or be admitted to a graduate program within six months after graduation.

Major program milestones occurring at less frequent intervals.

- Success of ABET accreditation visits; the initial accreditation visit will occur in fall 2012.

IV. PROGRAM JUSTIFICATION

Needs Assessment

MS&V Economic Impact and Cluster Analysis Study. The most recent regional study was conducted in 2004 to assess the overall economic impact of activity related to computational modeling, simulation, and visualization (MS&V) within the Hampton Roads region of southeastern Virginia. The study was intended to describe the scope of MS&V activity within the Hampton Roads region and, concurrently, to provide a framework within which an impact assessment could be undertaken. The purposes of the investigation were to:

(1) Assess the direct and indirect economic impact of MS&V on the Hampton Roads region;

(2) Develop and populate an MS&V mapping framework to show linkages between the key MS&V functions/groups and the pertinent vertical industries;

(3) Provide a framework within which the roles of different participants in the regional MS&V cluster can be identified and correlated; and

(4) Identify future MS&V growth potential and opportunities for the Hampton Roads region.

The study, titled "Modeling, Simulation & Visualization Economic Impact and Cluster Analysis Study for Hampton Roads Virginia" was conducted under the sponsorship of the Hampton Roads Planning District Commission (HRPDC), through a contract issued by the Old Dominion University Research Foundation to ANGLE Technology, Incorporated. The study was supported and financed by the following companies and organizations: Boeing Company, BMH, Booz-Allen-Hamilton, DDL Omni Engineering, General Dynamics-AIS, Lockheed Martin Global Vision Integration Center, Northrop-Grumman Mission Systems, SAIC, City of Hampton, City of Portsmouth, City of Norfolk, City of Suffolk, City of Virginia Beach, Hampton Roads Economic Development Alliance, Peninsula Alliance for Economic Development, Hampton Roads Planning District Commission, and Old Dominion University. The final report was issued by HRPDC in March 2005.

Key findings from the study indicate the importance of modeling and simulation to the Hampton Roads region. These findings are listed in the following.

(1) The MS&V cluster contributed $413 M annually to the region's output in 2004. This is projected to increase to $764 M in 2009. The largest share of this increase will occur within the service sector.

(2) The MS&V cluster accounted for $248 M in gross regional product (GRP) in 2004. This is projected to increase to $482 M in 2009. GRP is the impact on gross regional product, or the net impact on the regional economy, after the removal of production costs from regional sales.

(3) The MS&V cluster generates slightly over 4,000 jobs in Hampton Roads each year. This is projected to increase to nearly 7,000 jobs in 2009.

(4) The largest fraction of the cluster generated jobs, 2,700, are in the service sector. Other sectors experiencing a significant increase in employment include retail trade – 628 jobs, construction – 289 jobs, and finance, insurance and real estate – 134 jobs.

(5) The MS&V cluster contributed to a regional increase in population of 765 people in 2004. This is projected to increase to over 4,300 people in 2009.

Among the key observations enumerated in the study are the following statements.

(1) MS&V provides a significant contribution to the regional economy.

(2) Significant growth is projected across all reported impact measures.

(3) Potential exists to capture more defense activity and to diversify into other regional commercial markets over the next five years.

(4) Challenges for the MS&V cluster include workforce training and development issues and the local availability of specialized MS&V training.

The study concluded with four recommendations directed at accelerating the growth of the M&SV cluster in Hampton Roads. With respect to this proposal, the most significant recommendation is:

"Expand (MS&V) educational opportunities at the undergraduate, community college and high school level, as well as develop specialized training and certification courses to continually educate the existing MS&V workforce."

Summarizing the results of the MS&V economic impact study in the context of this program proposal, it is clear that modeling and simulation already is a significant component of the region's and state's economy. Modeling and simulation activity, in the military sector and especially in the commercial sector, has the potential to grow significantly. A necessary component for this growth is the availability of a well-educated and highly-trained M&S workforce. Regionally, educational programs already exist or are emerging at the high school, community college, and graduate levels. The missing link in the M&S education path is the availability of an undergraduate degree

program in modeling and simulation. This proposal for the development of an undergraduate degree program in Modeling and Simulation Engineering is made to address this critical need.

Employment Demand – National and State. As a new and emerging discipline, modeling and simulation engineering does not yet possess its own labor category. However, national and state employment needs of closely related labor categories in which M&S professionals are likely to be employed are available. Table 1 displays national employment projections in categories closely related to modeling and simulation engineering. These data are taken from the Occupational Outlook Handbook, Bureau of Labor Statistics, U.S. Department of Labor (www.bls.gov/oco/ocos027.htm). The table demonstrates a significant need for additional employment in categories in which M&S professionals are employed.

Table 1. National Employment Projections for Selected M&S-Related Categories

Labor Category	2006 Employment	2016 Projected Employment	Percent Increase
Computer and Information Scientists	25,000	31,000	22%
Computer Software Engineers, Applications	507,000	733,000	45%
Industrial Engineers	201,000	242,000	20%
Operations Research Analysts	58,000	65,000	11%
Training and Development Specialists	210,000	249,000	18%

Table 2 displays state employment projections for these same categories. These data are taken from Labor Market Data in the Virginia Workforce Connection (www.vawc.virginia.gov/analyzer). This table demonstrates that the state-level demand for employment in these categories is even greater than at the national level.

Table 2. Virginia Employment Projections for Selected M&S-Related Categories

Labor Category	2004 Employment	2014 Projected Employment	Percent Increase
Computer and Information Scientists	2,696	3,366	24.9%
Computer Software Engineer, Applications	30,397	48,392	59.2%
Industrial Engineers	3,769	4,572	21.3%
Operations Research Analysts	4,117	4,946	20.1%
Training and Development Specialists	9,443	12,045	27.6%

Employment Demand – Hampton Roads and Region. In preparation for developing this proposal, the Batten College of Engineering and Technology at Old Dominion University continues to contact a number of private companies, regional economic development agencies, and government organizations representative of the modeling and simulation community in Hampton Roads. The purpose for these contacts is two-fold. First, we want to solicit thoughts and recommendations concerning the curriculum content and program objectives for the M&SE program. Second, we request general estimates of workforce need and statements of support for the development of an undergraduate M&SE program. The response from those contacted so far was overwhelmingly in support of developing the M&SE program. The estimate of likely job openings for M&SE graduates that we received exceeds the University's near-term capability to recruit and educate students. We also received a number of very thoughtful suggestions concerning curriculum content. Those suggestions have been incorporated in the proposed M&SE showcase curriculum.

Letters from government and industry leaders expressing support for the development of the M&SE program are presented in Appendix D.

Student Demand. Potential student demand for the proposed undergraduate M&SE program is indicated by participation levels in two related programs, the Modeling and Simulation Program at the Advanced Technology Center in Virginia Beach and the Modeling and Simulation Graduate Programs at Old Dominion University. The rapid success of these two programs is described briefly in this section.

The Advanced Technology Center (ATC) is a partnership among Virginia Beach City Public Schools, Tidewater Community College, and the City of Virginia Beach. The Center offers eleven one- and two-year programs of study focused on computer-related professions. Students remain active in their neighborhood high schools while taking half-day classes at the Center. One of the programs offered at ATC is the Modeling and Simulation Program, AT-8462. This one-year course in computerized modeling, simulation, and animation is designed to provide students with the skills and knowledge desired by the engineering and business communities. Students gain an understanding of how computerized simulation, animations and 3D prototypes work in engineering planning and design. This is an advanced course for students interested in careers as designers or engineers. The course was established just five years ago; this year the

course enrolls nearly 40 students. With the assistance of the instructor for this course, we conducted a survey of the AT-8462 students in January 2008. Of the 36 students questioned, 25 students (69.4%) indicated an interest in pursuing a career in M&S, and 18 students (50%) indicated an interest in the proposed M&SE Program at Old Dominion University. While the availability of such a course currently is unique to Virginia Beach, there exist similar levels of interest in the other city school systems in Hampton Roads. These students are the potential feedstock for the proposed M&SE program.

Old Dominion University also conducted student surveys at the Virginia Beach Campus of Tidewater Community College (TCC) and Thomas Nelson Community College (TNCC) to determine the level of interest in M&S careers and the proposed M&SE

program. At TNCC, first- and second-year students enrolled in pre-engineering mathematics courses were surveyed in January 2008. This survey found a total of 45 students who indicated an interest in pursuing an M&S career, and 33 students interested in the proposed M&SE program. At TCC, pre-engineering students enrolled in EGR 120: Introduction to Engineering were surveyed in February 2008. This survey found a total of 12 students who indicated an interest in pursuing an M&S career. All 12 students indicated an interest in the proposed M&SE program. These surveys indicate that considerable interest exists in the local community colleges for the proposed M&SE program.

The student survey data from the Advanced Technology Center, Thomas Nelson Community College and Tidewater Community College are included in Appendix E.

As described earlier in this proposal, M&S Graduate Programs at Old Dominion University have experienced very rapid growth. The M&S Master's Degree Program, started in 1998, presently enrolls more than 70 students. The M&S Doctoral Degree Program enrolls more than 60 students. This rapid growth is an indicator of the level of interest and the job market demand for students having education and training in this exciting and growing technology sector.

Program Duplication. The proposed M&SE program is thought to be the first undergraduate program of its type. There is no duplication of programs with other state-assisted colleges and universities within Virginia.

Enrollment Projections

In this section, estimates of program enrollments from academic year 2009-2010 through academic year 2015-2016 are made. These enrollment projections are thought to be conservative; actual enrollments are likely to be somewhat higher.

Enrollments are estimated using the enrollment projection worksheet displayed in Table A.4 in Appendix A. The following assumptions are made in this worksheet.

- Freshmen-In enrollment represents an estimate of the number of students entering the Freshman Division who will select the M&SE program. This number is difficult to measure because most students do not actually select a program until near the end of their freshman year. The estimate for academic year 2008-2009 is small because there will be little time to advertise the program before these students must make a major selection. The estimate for academic year 2009-2010 is larger because of the effects of promoting the program. A growth rate of 10% in freshman recruits is assumed for the next four years when steady-state is assumed to be reached.

- Freshmen-Out (Sophomores In) estimates are computed assuming a 20% attrition rate.

- Sophomores-Out (Juniors Forward) estimates are computed assuming a 20% attrition rate.

- Juniors-Transfer estimates represent transfer students from TCC and TNCC; a 20% growth rate in transfer students is assumed as additional community colleges develop M&SE articulation agreements with ODU.

- Juniors-In estimates represent ODU sophomore students moving forward to their junior year plus community college students transferring to ODU as juniors.

- Juniors-Out estimates are computed assuming a 10% attrition rate.

- Seniors-Out estimates are computed assuming a 10% attrition rate.

- The number of program students entering (and leaving) each academic year is computed by adding the number of students in (and the number of students out) in each class for a given academic year. Only sophomores through seniors are counted. The additional freshman enrollment in the Engineering Fundamentals Division is not counted in these estimates.

- Program graduates are estimated using the seniors-out numbers.

The results of this analysis are shown in Table 3 below. The program will start with approximately 16 sophomore students in academic year 2009-2010 and will rapidly increase to 103 students in academic year 2013-2014. Although not shown in Table 3, which follows the standard SCHEV format, the first senior class will graduate in academic year 2011-2012 and will consist of approximately 19 students. The number of graduates each year will grow to 28 students by academic year 2013-2014.

Table 3. Projected Enrollment

Year 1		Year 2		Year 3		Year 4			Year 5 **Target Year**		
2009 - 2010		2010 - 2011		2011 - 2012		2012 - 2013			2013 - 2014		
HDCT	FTES	HDCT	FTES	HDCT	FTES	HDCT	FTES	GRAD	HDCT	FTES	GRAD
16	13	47	40	78	68	92	79	25	103	90	28

V. RESOURCE REQUIREMENTS

Narrative

In this section, the projected resource requirements for the M&SE program are estimated. The narrative presented in this section supports the entries in the estimated resource needs tables included at the end of the section. The narrative is organized according to the entries in these tables.

It is important to recognize the difference between implementing the M&SE program as a program within an academic college structure, as proposed here, compared to implementing the M&SE program as a program housed in a department structure. In the proposed scenario, the M&SE program will not own faculty; that is, it will utilize faculty that are assigned to various departments within the University. For this reason, the M&SE program will not have the benefit of being able to generate revenue through faculty purchase release time and indirect cost return from externally funded research projects. This means that the M&SE program will not have the capability to subsidize its educational activities based on the research activities of its faculty. Thus, all instruction and operating costs for the M&SE program will need to be planned and budgeted as part of the program base costs. This is a significantly different way of operating an undergraduate program compared to the other engineering programs within BCET. This will be the only undergraduate program in which budgeted funds must cover all program activities.

The introduction of M&SE program will have a noticeable impact on the two supporting colleges, the Batten College of Engineering and Technology and the College of Sciences, because the majority of the program core courses is hosted in these two colleges. The impact on the other areas of the University will be less noticeable. This impact will come primarily from the General Education requirements and the requirement that M&SE students complete a formal minor or approved electives. In these activities, the M&SE student instructional load will be distributed across a large number of departments and potential courses. As a result, it is unlikely that any new course sections or additional laboratory or recitation sections will need to be added because of the M&SE program enrollment.

The effects of the M&SE program on the College of Sciences and the Batten College of Engineering and Technology are computed considering all core M&SE courses taught by the two colleges. Using M&SE program enrollment estimates from Table A4 in Appendix A, the number of additional students likely to be enrolled in these courses in 2009-2010 and 2014-2015 is identified. These enrollment numbers then are converted to estimates of additional lecture sections or laboratory/recitation sections. The conversion process is based on the present maximum size of class sections and historical enrollment data showing class enrollments as a percentage of capacity. Clearly this process is somewhat subjective; however, it does lead to reasonable estimates of the additional faculty and graduate teaching assistant resources needed to implement and then support the M&SE program.

The following assumptions and conversion factors are used in this section. It is assumed that all lecture sections are taught by full-time faculty and that all laboratory/recitation sections are taught by graduate teaching assistants (GTAs). A full-time annual section load of six lecture sections is equated to 1 FTE faculty. A full-time annual section load of 4 laboratory/recitation sections is equated to 1 FTE GTA.

Faculty. The Batten College of Engineering and Technology will offer two new lecture sections to support the M&SE program in 2009-10. In addition, the College must provide 0.25 FTE faculty for the UPD position. By 2013-14, this load increases to 12 new lecture sections and 0.33 FTE faculty for the UPD position. Thus, the additional faculty instructional load for the M&SE program is 0.58 FTE faculty in 2009-10. By 2013-14, this faculty instructional load increases to 2.33 FTE faculty. The Batten College of Engineering and Technology will reallocate 0.58 FTE faculty in 2009-10 and additional 1.75 FTE faculty by 2013-14 to cover the instructional needs of the M&SE program.

The College of Sciences will offer three new lecture sections in 2009-10; this number increases to seven new lecture sections in 2013-2014. Thus, the additional faculty instructional load for the M&SE program is 0.50 FTE faculty in 2009-10. By 2013-2014, this faculty instructional load increases to 1.17 FTE faculty. The College of Sciences will reallocate 0.50 FTE faculty in 2009-10 and additional 0.67 FTE faculty by 2013-2014 to cover the instructional needs of the proposed program.

Overall, the M&SE program will create an instructional load of 1.08 FTE faculty in 2009-10, increasing to 3.50 FTE faculty in 2013-2014.

Graduate Teaching Assistants. The Batten College of Engineering and Technology will offer five new laboratory/recitation sections to support the M&SE program in 2009-10. By 2013-2014, this load increases to 18 laboratory/recitation sections. Thus, the additional GTA requirement for the M&SE program is 1.25 FTE GTAs in 2009-10, increasing to 4.50 FTE GTAs in 2013-2014. It is requested that funds for these GTA positions be reallocated by Old Dominion University at $15,000/GTA/AY.

The College of Sciences will offer 7 new laboratory/recitation sections in 2009-10; this number increases to 14 laboratory/recitation sections in 2013-2014. Thus, the additional GTA instructional load for the M&SE program is 1.75 FTE GTAs in 2009-10, increasing to 3.50 FTE GTAs in 2013-2014. It is requested that funds for these GTA positions be reallocated by Old Dominion University at $15,000/GTA/AY.

Overall, the M&SE program will create an instructional load of 3.00 FTE GTAs in 2009-10, increasing to 8.00 FTE GTAs in 2013-2014.

Classified Positions. The M&SE program will require two support positions, a Coordinator of Student Affairs and a Program Secretary. The Coordinator of Student Affairs will provide two functions, routine student advising and administrative support for the UPD. The duties of this position include maintenance of student records, student registration, routine transfer evaluation, development of program literature and promotional materials, assisting with recruiting activities, and oversight of the program

office. The Program Secretary will serve as receptionist and will provide administrative and instructional support to the UPD, the Coordinator of Student Affairs, the M&SE Undergraduate Program Committee, and the M&SE program instructional faculty.

These positions are required only part-time; thus, the positions can be shared with other BCET departments or programs. In 2009-10, the Coordinator of Student Affairs will be needed 25% time and the Program Secretary will be needed 25% time. By 2013-2014, both positions will be required 50% time. Thus, the M&SE program will require 0.50 FTE positions in 2009-10, increasing to 1.00 FTE positions in 2013-2014. For the initial year, BCET will reallocate $27,300 for 0.50 FTE classified position. It is requested that $27,300 be reallocated by Old Dominion University to cover the need for the additional 0.50 FTE classified position by 2013-2014.

Targeted Financial Aid. Undergraduate programs in the Batten College of Engineering and Technology participate in financial aid programs coordinated at the College and University levels. The M&SE program will share in these financial aid programs.

Equipment. In 2009-10, the M&SE program will need to establish the M&SE Simulation Laboratory. The laboratory will be equipped with 10 student workstations and one instructor workstation, a local area network, an applications server, and overhead projection capabilities. The BCET computer laboratory housed in KAUF 206 will be used for this purpose.

By 2013-2014, the M&SE program will require a second laboratory facility, the Capstone Design Laboratory. This laboratory will be equipped in a manner similar to the Simulation Laboratory, but will include additional furniture and teleconferencing capability. In order to meet this need one of the existing computer laboratories in Kaufman Hall or E. V. Williams Engineering Computations and Sciences Building will be modified to enable teleconferencing at a cost of approximately $15,000 through the Equipment Trust Fund.

Library. The University already hosts graduate programs in M&S and operates a research center whose focus is M&S. The same library holdings that support these activities will be adequate to support the M&SE undergraduate program.

Telecommunications. During the first several years of program operation, the M&SE staff will consist of existing positions shared with other College departments or programs. Thus, initially, there will be little added costs for telecommunications. As the M&SE program grows, a Program Office will be established. At that time, a modest telecommunications budget will need to be established to support a three-person office and two laboratory areas.   Program faculty will continue to be supported by their home departments. A base budget of approximately $2,500 will be required for telecommunications by 2013-2014. It is requested that this amount be reallocated by Old Dominion University.

Space. The M&SE program will require the development of several new office and laboratory facilities. These facilities include a Program Office, an M&SE Simulation Laboratory, and eventually an M&SE Capstone Design Laboratory.

During the first two or three years of program operation, the M&SE Program Office will be staffed by individuals assigned part-time to the program. During this period, the staff will be able to work from their existing office spaces. Some office rearrangement may be required to establish efficient office operation. As the program expands, it will become necessary to establish a dedicated M&SE Program Office. The Program Office will consist of a reception area staffed by the Program Secretary, an adjoining staff office to house the Coordinator of Student Affairs, and a second adjoining faculty office to house the Undergraduate Program Director. The Program Office will require a total of approximately 500 square feet of space. It is anticipated that M&SE will share the use of KAUF 206 for this purpose.

The M&SE Simulation Laboratory will be designed to support the three core laboratory courses: MSIM 281 – Discrete Event Simulation Laboratory; MSIM 382 – Continuous Simulation Laboratory; and MSIM 383 – Distributed Simulation Laboratory. During the first two or three years of program operation, this laboratory also will support the capstone design courses: MSIM 488 – Capstone Design I and MSIM 489 – Capstone Design II. The laboratory will be configured as an advanced computing lab containing ten student workstations, an instructor workstation with overhead projection capability, and a lab application server and LAN suitable for establishing a distributed computing environment. The M&SE Simulation Laboratory will require approximately 650 square feet of space. It is likely that existing space located either in Kaufman Hall or the Engineering and Computational Sciences Building can be reallocated for this purpose. As the number of formatted laboratory sections grows and the number of students taking the capstone design courses increases, it will be necessary to develop a second laboratory facility dedicated to the capstone design courses.

The M&SE Capstone Design Laboratory will be required beginning in the fourth year of program operation. The laboratory will be designed to support the two capstone design courses: MSIM 487 – Capstone Design I; and MSIM 488 – Capstone Design II. This facility will be equipped in a manner similar to the M&SE Simulation Laboratory. However, it will have in addition several small group conference areas where student design teams can conduct design sessions. This facility also should have teleconferencing capability to facilitate interactive design sessions with remotely located groups. The M&SE Capstone Design Laboratory will require approximately 750 square feet of space. This facility will double as a staff conference room and student tutoring room. The M&SE program will share the use of an existing computer laboratory in Kaufman Hall or E.V. Williams Computational Engineering and Sciences Building for this purpose.

Many of the core computer science courses require a supporting laboratory environment. However, since no new computer science courses will be offered, the additional student load will be supported using existing Department of Computer Science laboratory facilities. These facilities include the following laboratories.

Introductory Computing Lab located in Room 230A of the Education Building. This computing laboratory consists of 25 student workstations and occupies 600 square feet of space. The laboratory supports instruction in CS 150 – Problem Solving and Programming I.

Problem Solving Lab located in Room 245 of the Education Building. This computing laboratory consists of 35 student workstations and occupies 2,280 square feet of space. The laboratory supports instruction in CS 250 – Problem Solving and Programming II, CS 252 – Introduction to Unix for Programmers, and CS 350 – Introduction to Software Engineering.

Advanced Projects Lab located in Room 243 of the Education Building. This computing laboratory consists of 8 student workstations and occupies 950 square feet of space. The laboratory supports instruction in CS 361 – Advanced Data Structures and Algorithms.

It is anticipated that the M&SE program also will have access to the many specialized research facilities of VMASC for specialized instruction and project needs. VMASC facilities are equipped for a broad range of M&S activities including visualization (CAVE, Vision Domes, Power Wall Displays), simulation development, distributed simulation, database development, and training and gaming. However, the first priority for these facilities is to support VMASC research projects; thus, these facilities are available for instruction only when that use will not interfere with ongoing research activities.

Other Costs. The M&SE program will incur normal operating costs for things like copying, office supplies, lab supplies, program literature, program promotion, and student recruiting. The expenditures for operation and non-personal services are estimated to be approximately $15,000 in 2009-10 and are expected to increase to $25,000 per year by 2013-2014. It is requested that funds be reallocated by Old Dominion University to cover the operating costs of the M&SE program.

Projected Resource Needs Forms

The costs described in this narrative are entered on the "Projected Resource Needs for Proposed Program" in the pages that follow.

Projected Resource Needs

> **Instructions:**
> In a <u>narrative</u>, describe the available and additional program resources anticipated in the following categories, <u>explaining the need to operate the program</u>:
>
> | | |
> |---|---|
> | full-time faculty | part-time faculty/adjunct faculty |
> | graduate assistants | classified positions |
> | targeted financial aid | equipment (including computers) |
> | library | telecommunications |
> | space | other resources (specify) |
>
> Describe all sources of funds and the anticipated effect of any reallocation of funds and faculty within the instructional unit.
>
> With the assistance of the institution's finance office or chief financial officer, complete and attach the "form "<u>Projected Resource Needs for Proposed Program</u>."
> On that form:
> - answer the questions listed in Part A.
> - use the number of full-time equivalent (FTE) positions when completing the table in Part B.
> - in Part C, use 0% salary increases and no inflation factor for any other cost item. At the bottom of the table, specify the amounts and sources of funds for the proposed program.

PROJECTED RESOURCE NEEDS FOR PROPOSED PROGRAM

Part A: Answer the following questions about general budget information.

- Has or will the institution submit an addendum budget request to cover one-time costs?   Yes_____ No__X__

- Has or will the institution submit an addendum budget request to cover operating costs?   Yes_____ No__X__

- Will there be any operating budget requests for this program that would exceed normal operating budget guidelines (for example, unusual faculty mix, faculty salaries, or resources)?   Yes_____ No__X__

- Will each type of space for the proposed program be within projected guidelines?   Yes__X___ No_____

- Will a capital outlay request in support of this program be forthcoming?   Yes_____ No__X__

Part B: Fill in the number of FTE positions needed for the program

	Program Initiation Year 2009-2010		Expected by Target Enrollment Year 2013-2014	
	On-going and reallocated	Added (New)	Added (New)**	Total FTE positions
Full-time faculty*				0.00
Part-time faculty (faculty FTE split with other unit(s))	1.08		2.42	3.50
Adjunct faculty				0.00
Graduate assistants		3.00	5.00	8.00
Classified positions	0.50		0.50	1.00
TOTAL	1.58	3.00	7.92	12.50

* Faculty dedicated to the program
** Added **after** initiation year

Part C: Estimated resources to initiate and operate the program

	Program Initiation Year		Expected by Target Enrollment Year	
	2009- 2010		**2013- 2014**	
Full-time faculty	0.00	0.00	0.00	0.00
salaries				$0
fringe benefits				$0
Part-time faculty (faculty FTE split with unit(s))	1.08	0.00	2.42	3.50
salaries	$97,200		$217,800	$315,000
fringe benefits	$35,580		$79,710	$115,290
Adjunct faculty	0.00	0.00	0.00	0.00
salaries				$0
fringe benefits				$0
Graduate assistants	0.00	3.00	5.00	8.00
salaries		$45,000	$75,000	$120,000
fringe benefits				$0
Classified Positions	0.50	0.00	0.50	1.00
salaries	$20,000		$20,000	$40,000
fringe benefits	$7,300		$7,300	$14,600
Personnel cost				
salaries	$117,200	$45,000	$312,800	$475,000
fringe benefits	$42,880	$0	$87,010	$129,890
Total personnel cost	$160,080	$45,000	$399,810	$604,890
Equipment			$15,000	$15,000
Library				$0
Telecommunication costs			$2,500	$2,500
Other costs		$15,000	$10,000	$25,000
TOTAL	**$160,080**	**$60,000**	**$427,310**	**$647,390**

Part D: Certification Statement(s)

The institution will require additional state funding to initiate and sustain this program.

_____ Yes   _____
                      Signature of Chief Academic Officer

___X__ No   _____
                      Signature of Chief Academic Officer

If "no," please complete Items 1, 2, and 3 below.

1. Estimated $$ and funding source to initiate and operate the program.

Funding Source	Program initiation year 2009 - 2010	Target enrollment year 2014 - 2015
Reallocation within the department or school *(Note below the impact this will have within the school or department.)*	$98,610	$313,750
Reallocation within the *institution (Note below the impact this will have within the school or department.)*	$121,470	$318,640
Other funding sources *(Please specify and note if these are currently available or anticipated.)*		$15,000

2. Statement of Impact/Other Funding Sources.

To meet the instructional needs 3.50 FTE faculty positions should be dedicated to the proposed program. However, this instructional load will be distributed across several departments in two large colleges, and therefore the impact will be minimal. The reallocation of additional funds within the college and university is well justified since the program's enrollment is expected to exceed 100 FTE students by 2014-2015 generating significant tuition revenues.

The other funding source included in the table for $15,000 is the anticipated Equipment Trust Fund of the Commonwealth of Virginia.

3. Secondary Certification.
If resources are reallocated from another unit to support this proposal, the institution will **not** subsequently request additional state funding to restore those resources for their original purpose.

__X__ Agree   _____
                        Signature of Chief Academic Officer

_____ Disagree _____
                        Signature of Chief Academic Officer

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**Modeling and Simulation Engineering
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APPENDIX A
PROGRAM CURRICULUM AND ENROLLMENT PROJECTION

Table A.1. Content of the M&SE Curriculum

Curriculum Content	Credits
Mathematics and Basic Sciences	32

Mathematics (17)
    Calculus I (4)
    Calculus II (4)
    Differential Equations (3)
    Probability and Statistics (3)
    Discrete Mathematics (3)
Basic Sciences (15)
    University Physics I (4)
    University Physics II (4)
    Chemistry I (4)
    Chemistry II (3)

Modeling and Simulation Engineering Core	48

Computer Science (11)
    Programming II (4)
    Introduction to UNIX (1)
    Data Structures (3)
    Theoretical Computer Science (3)
M&SE Fundamentals (27)
    Introduction to M&S (3)
    Discrete Event Simulation (3)
    Continuous Simulation (3)
    Distributed Simulation (3)
    Simulation Software Design (3)
    Artificial Intelligence for M&S (3)
    Analysis for M&S (3)
    Computer Graphic and Visualization (3)
    Project Management (3)
M&SE Laboratories (10)
    Discrete Event Simulation Lab (1)
    Continuous Simulation Lab (1)
    Distributed Simulation Lab (1)
    Capstone Design I (4)
    Capstone Design II (3)

General Education	37

Lower Division (21)
    English Composition (3)
    Technical Writing (3)
    Programming I (4)
    Hum/SS Perspectives (15)
Upper Division (12)
    Approved Minor (12)

Other Requirements	11

College (5)
    Engineering & Technology I (2)
    Engineering & Technology II (2)
    FE Exam Review (1)
Program (6)
    Approved Electives (6)

TOTAL CREDITS	128

Table A. 2 Bachelor of Science Degree Program in Modeling & Simulation Engineering

Course Number	Course Title	Credits	Pre-/Co-Requisites
Freshman Year – First Semester			
MATH 211	Calculus I	4	P-Placement Exam
ENGL 110C	English Composition I	3	P-Placement Exam
CHEM115N	Chemistry I	4	C-MATH 102M
ENGN 110	Engineering & Technology I	2	C-MATH 162M
HUM/SS	General Education	3	_____
Freshman Year – Second Semester			
MATH 212	Calculus II	4	P-MATH 211
CHEM 117	Chemistry II	3	P-CHEM 115N
CS 150	Programming I	4	P-MATH 102M
PHYS 231N	University Physics I	4	P/C-MATH 211
ENGN 111	Engineering & Technology II	2	P-MATH 162M
Sophomore Year – First Semester			
MATH 307	Differential Equations	3	P-MATH 212
PHYS 232N	University Physics II	4	P-PHYS 231N
CS 381	Discrete Structures	3	P-MATH 163 & CS 150
HUM/SS	General Education	3	_____
MSIM 201	Introduction to M&S	3	P-MATH 211, C-CS 150
Sophomore Year – Second Semester			
STAT 330	Probability and Statistics	3	P-MATH 211
CS 250	Programming II	4	P-CS 150, C-CS 252
CS 252	Introduction to UNIX	1	C-CS 250
HUM/SS	General Education	3	_____
MSIM 205	Discrete Event Simulation	3	P-MSIM 201, C-STAT 330
MSIM 281	M&S Laboratory 1	1	C-MSIM 205
Junior Year – First Semester			
CS 361	Data Structures	3	P-CS 250 & CS 252
HUM/SS	General Education	3	_____
ENGL 131C	Technical Writing	3	P-ENGL 110C
MSIM 320	Continuous Simulation	3	P-MSIM 205 & MATH 307
MSIM 382	M&S Laboratory 2	1	C-MSIM 320, P-CS 250
MSIM 351	Analysis for M&S	3	P-MSIM 205, P or C-MSIM 320
Junior Year – Second Semester			
MSIM 330	Simulation Software Design	3	P-CS 361
HUM/SS	General Education	3	_____
Depth	Minor	3	_____
MSIM 306	Distributed Simulation	3	P/C-MSIM 320
MSIM 383	M&S Laboratory 3	1	C-MSIM 306
ENMA 401	Project Management	3	P-MSIM 205 & MSIM 351
Senior Year – First Semester			
Depth	Minor	3	_____
MSIM 441	Computer Graphics & Visualization	3	P-CS 361 & MSIM320
MSIM 487	Capstone Design I	4	P/C-MSIM 306 & CS 350
CS 390	Theoretical CS	3	P-CS 250 & CS 381
ELECT	Approved Elective	3	_____
Senior Year – Second Semester			
Depth	Minor	3	_____
Depth	Minor	3	_____
MSIM 488	Capstone Design II	3	P-MSIM 487
MSIM 431	Artificial Intelligence for M&S	3	P-MSIM 306 & CS 361
ELECT	Approved Elective	3	_____
ENGN 401	FE Exam Review	1	P-Senior Standing

Table A.3 Existing and Potential Minors Related to M&SE

College	Department	Minor Focus	In Place
Arts & Letters	Political Science & Geography	Geographic Information Science M&S	Yes
Business & Public Administration	Information Tech/Decision Sciences	Decision Support M&S	Yes
Education	Educational Curriculum & Instruction	Education & Gaming M&S	No
Engineering & Technology	Aerospace Engineering	Engineering & Science M&S	Yes
	Civil & Environmental Engineering	Engineering & Science M&S	Yes
		Transportation M&S	No
	Electrical & Computer Engineering	Engineering & Science M&S	Yes
	Engineering Management	Decision Support M&S	Yes
		Military & Homeland Security M&S	No
	Mechanical Engineering	Engineering & Science M&S	Yes
		Medical & Bio-Science M&S	No
Health Sciences	Health Services Research	Medical & Bio-Science M&S	No
Sciences	Biological Sciences	Medical & Bio-Science M&S	Yes
	Computer Science	Engineering & Science M&S	Yes
	Ocean, Earth & Atmospheric Sciences	Engineering & Science M&S	Yes
	Psychology	HF/HCI/HBM M&S	Yes

Table A.4
Enrollment Projection Worksheet

Class	Academic Year						
	08-09	**09-10**	**10-11**	**11-12**	**12-13**	**13-14**	**14-15**
Freshmen In	20	30	33	36	40	44	45
Freshmen Out	16	24	26	29	32	35	36
Sophomores In	--	16	24	26	29	32	35
Sophomores Out	--	13	19	21	23	26	28
Juniors Forward	--	--	13	19	21	23	26
Juniors Transfer	--	--	10	12	14	17	20
Juniors In	--	--	23	31	35	40	46
Juniors Out	--	--	21	28	31	36	41
Seniors In	--	--	--	21	28	31	36
Seniors Out	--	--	--	19	25	28	32
Students In	--	16	47	78	92	103	117
Students Out	--	13	40	68	79	90	101
Graduates	--	--	--	19	25	28	32

Catalog Descriptions for the Core M&SE Courses
(New courses are marked with an asterisk)

MSIM 201* – Introduction to Modeling and Simulation Engineering. Lecture 3 hours; 3 credits. Prerequisite: MATH 212. Corequisite: CS 150. First course for Modeling and Simulation Engineering students. M&SE discipline surveyed at an overview level of detail. Topics include basic definitions, M&S paradigms and methodologies, applications, and related sub-disciplines. The course provides a general conceptual framework for further M&SE studies.

MSIM 205* – Discrete Event Simulation. Lecture 3 hours; 3 credits. Prerequisite: MSIM 201. Corequisites: STAT 330 and MSIM 281. An introduction to the fundamentals of modeling and simulating discrete-state, event-driven systems. Topics include basic simulation concepts and terms, queuing theory based models for discrete event systems, structure of discrete event simulations, input data representation, output data analysis, verification and validation, and the design of simulation experiments.

CS 250 – Problem Solving and Programming II. Lecture 3 hours; laboratory 2.5 hours; 4 credits. Prerequisites: CS 148 or 150 and MATH 162M. Corequisite: CS 252. Laboratory work required. Software design issues arising in large problems and C++ constructs aiding in their solution. Topics include the software life cycle, methods of functional decomposition, design documentation, abstract data types and classes, common data structures, algorithmic patterns, and testing and debugging techniques. The standard library and templates are introduced. Large project required.

CS 252 – Introduction to Unix for Programmers. Lecture 1 hour; 1 credit. Prerequisites: CS 147, 149D, or 150. Laboratory work required. Available for pass/fail grading only. An introduction to Unix with emphasis on the skills necessary to be a productive programmer in Unix, Linux, and related environments. Topics include command line shells, files and directories, editing, compiling and common command line utilities.

MSIM 281* – Discrete Event Simulation Laboratory. Laboratory 2 hours; 1 credit. Corequisite: MSIM 205. A laboratory course designed to provide a hands-on introduction to the development and application of discrete event simulation.   Topics include an introduction to one or more discrete event simulation tools, common modeling constructs, data gathering and input data modeling, design of simulation experiments, output data analysis, and verification and validation. The design and implementation of a series of increasingly complex simulations of various discrete event systems are conducted. The laboratory is designed to accompany MSIM 205.

MSIM 306* – Distributed Simulation. Lecture 3 hours; 3 credits. Prerequisite: MSIM 320. An introduction to distributed simulation. Topics include motivation for using distributed simulation, distributed simulation architectures, time management issues, and distributed simulation approaches including ALSP, DIS, and HLA.

MSIM 320* – Continuous Simulation. Lecture 3 hours; 3 credits. Prerequisites: MATH 307 and MSIM 205. Corequisite: MSIM 382. An introduction to the fundamentals of modeling and simulating continuous-state, time-driven systems. Topics include differential equation representation of systems, formulation of state variable equations, numerical integration, and techniques for numerical solution of differential equations including the Taylor algorithm and the methods of Runge-Kutta.

MSIM 330* – Simulation Software Design. Lecture 3 hours; 3 credits. Prerequisite: CS 361. Introduction to software development methodologies. Topics include life cycle models, specification and design methods, informal and formal specification techniques, configuration management, verification and validation, life cycle management, and schedules and budgets.

MSIM 351* – M&S Analysis. Lecture 3 hours; 3 credits. Prerequisite: MSIM 205. Pre- or Corequisite: MSIM 320. An introduction to analysis techniques appropriate to the conduct of M&S studies. A systematic approach to the formulation of M&S problems and design of experiments. An introduction to deterministic and stochastic models for decision making including optimization methods, linear and other programming models, and queuing theory.

CS 361 – Advanced Data Structures and Algorithms. Lecture 3 hours; 3 credits. Prerequisites: MATH 163, CS 252 and either CS 250 or 333. Laboratory work required. Common abstract data types, including vectors, lists, stacks, queues, sets, maps, heaps, and graphs. Standard C++ interfaces for these ADT's. Generic programming via iterators and templates. Choosing data structures and algorithms to implement ADT's, via analysis of their time and space requirements.

MSIM 382* – Continuous Simulation Laboratory. Laboratory 2 hours; 1 credit. Corequisite: MSIM 320. A laboratory course designed to provide a hands-on introduction to the development and application of continuous simulation. Topics include an introduction to one or more continuous simulation tools, modeling of various physics-based systems, and numerical solution of differential equations. The design and implementation of a series of increasingly complex simulations of various continuous systems are conducted. The laboratory is designed to accompany MSIM 320.

MSIM 383* – Distributed Simulation Laboratory. Laboratory 2 hours; 1 credit. Corequisite: MSIM 306. A laboratory course designed to provide a hands-on introduction to the development and application of distributed simulation. Topics include the design and evaluation of distributed simulations using DIS and HLA. The laboratory is designed to accompany MSIM 306.

CS 390 – Introduction to Theoretical Computer Science. Lecture 3 hours; 3 credits. Prerequisites: CS 250 and 381. Elementary study of theoretical aspects of computer science. Topics in formal languages and automata theory are covered including regular languages, regular expressions, finite automata, grammars, Turing machines, and unsolvable problems.

ENMA 401 – Project Management. Lecture 3 hours; 3 credits. Prerequisite: junior standing. Foundations, principles, methods, and tools for effective design and management of projects in technology-based organizations. Project organization, life cycle, planning, scheduling, implementation, control, and evaluation. Special emphasis on project leadership, problem solving in team-based projects, project failure analysis, and advanced methods. Use of case studies and applications to reinforce course concepts. Students design and plan a project from concept through completion including proposal and post-project analysis.

MSIM 431* – Artificial Intelligence for M&S. Lecture 3 hours; 3 credits. Prerequisites: CS 361 and MSIM 320. An introduction to the use of knowledge-based systems in modeling and simulation. Knowledge-based systems are defined and basic AI concepts including search techniques, deduction with formal logic, and languages for symbolic computation, are presented. Implementation techniques, including rule-base representation and object-oriented programming, are discussed. Modeling and simulation applications for knowledge-based systems are described.

MSIM 441* – Computer Graphics and Visualization. Lecture 3 hours; 3 credits. Prerequisite: CS 361. An introduction to graphical systems and methods. Topics include basic primitives, windowing, transformations, hardware, interaction devices, 3-D graphics, curved surfaces, solids, and realism techniques such as visible surface, lighting, shadows, and surface detail. Applications to modeling and simulation including 2-D and 3-D solid models, data visualization, and animation.

MSIM 487* – Capstone Design I. Lecture 2 hours; laboratory 3 hours; 4 credits. Prerequisite: senior standing in M&SE program. Part one of the senior capstone design experience for modeling and simulation engineering majors. Lectures focus on providing professional orientation and exploration of the M&S design process. Individual and group design projects focus on the conduct of a complete M&S project. Oral and written communication skills are stressed. Industry-sponsored projects are an option.

MSIM 488* – Capstone Design II. Lecture 1 hour; laboratory 3 hours, 3 credits. Prerequisite: MSIM 487. Part two of the senior capstone design experience for modeling and simulation engineering majors. Lectures focus on providing professional orientation and exploration of the M&S design process. Individual and group design projects focus on the conduct of a complete M&S project. Oral and written communication skills are stressed. Industry-sponsored projects are an option.

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**APPENDIX B
OLD DOMINION UNIVERSITY M&S AFFILIATED FACULTY
Academic Year 2008-2009**

Modeling and Simulation Graduate Program
Old Dominion University

AFFILIATED FACULTY

Article I.   Academic Year 2008-2009

The Modeling and Simulation Graduate Program at Old Dominion University is a multi-disciplinary program supported by faculty from across the University. M&S Affiliated Faculty are individuals that have a faculty appointment in an academic department, are certified for graduate instruction, teach courses in the Modeling and Simulation Graduate Program, conduct research relevant to M&S, and supervise M&S student thesis and dissertation research.

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**Modeling and Simulation Engineering
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**APPENDIX C
DRAFT ARTICULATION AGREEMENT WITH TCC AND TNCC**

BS Modeling and Simulation Engineering		TCC and TNCC AS Transfer Degree to ODU			
ODU degree		**TCC Degree Program**		**TNCC Degree Program**	
Semester 1					
CHEM 115 N	4	CHM 111	4	CHM 111	4
ENGN 110	2	EGR 120	2	EGR 120	2
ENGL 110C	3	ENG 111	3	ENG 111	3
SS/Humanities	3	HIS (HIS 101, 102, 111, 112, 121 or 122)	3	HIS (HIS 101, 102, 111, 112, 121 or 122)	3
MATH 211 Calculus I	4	MTH 173 Calculus I	5	MTH 173 Calculus I	4
		SDV 100	1	SDV 100	1
Semester Credit Hours:	16		18		17
Semester 2		Semester 2			
CHEM 117	3	CHM 112	4	CHM 112	4
CS 150 Programming I	4	EGR 125 C++	4	CSC 201	4
MATH 212 Calc II	4	MTH 174 Calc II	5	MTH 174 Calc II	4
	0	Social Science Elective	3	ECO 201, GEO 200 or 210, PLS 135 or 241, PSY 201 or 231, SOC 200 or 211	3
PHYS 231N	4	PHY 241	4	PHY 241	4
ENGN 111	2	* with completion of AS degree	0	* with completion of AS degree	0
Semester Credit Hours:	17		20		19
Semester 3		Semester 3			
MATH 307 Differential Eqns	3	MTH 279 Differential Eqns	4	MTH 291	3
CS 381 Discrete Structures	3	MTH 287 Mathematical Structures	3	MTH 287 Mathematical Structures	3
MSIM 201 Introduction to M&S	3	MSIM XXX Introduction to M&S	3	MSIM XXX Introduction to M&S	3
SS/**Humanities**	3	Humanities	3	PHI 101, 102, 211, 212, REL 200, 210, 231, 232, ENG 121, 211, 212, 241, 241,243,244, 251,252, 253,254,273,or 279	3
PHYS 232N	4	PHY 242	4	PHY 242	4
Semester Credit Hours:	16		17		16
Semester 4		Semester 4			
STAT 330 Probability and Statistics	3	MTH 243 Probability & Statistics I prereq - MTH 174	3	MTH 243 Probability & Statistics I prereq - MTH 174	3
CS 250 Programming II	4	CSC 202	3	CSC 202	3
CS 252 Introduction to Unix	1	IT?? Or CS?? 1 credit Intro to Unix (To be developed)	1	IT?? Or CS?? 1 credit Intro to Unix (To be developed)	1
SS/**Humanities**	3	Humanities	3	ART 101 or 102 MSU 121 or 122	3
MSIM 205 Discrete Event Simulation	3	MSIM XXX Discrete Event Simulation	3	MSIM XXX Discrete Event Simulation	3
MSIM 281 M&S Lab 1	1	MSIM XXX M&S Lab 1	1	MSIM XXX M&S Lab 1	1
ENGL 131C	0	ENG 131	3	ENG 115	3
		PE/Health	1	PE/Health	1
Semester Credit Hours:	15		18		18
Total Credit Hours:	64		73		70

**Modeling and Simulation Engineering
Program Proposal**

**APPENDIX D
M&SE Program Support Letters**

LOCKHEED MARTIN

April 17, 2007

Professor Roland R. Mielke, Ph.D.
Modeling and Simulation Program Director
231 Kaufman Hall
Department of Electrical and Computer Engineering
Old Dominion University
Norfolk, Virginia 23529

Dear Professor Mielke:

I am writing to express the support of Lockheed Martin's Center for Innovation for Old Dominion University's proposal to establish an undergraduate degree program in Modeling and Simulation Engineering.

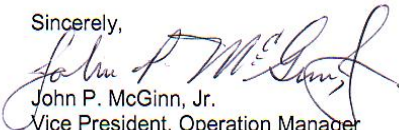The Center for Innovation is a Corporate facility that fosters the integration of advanced technology with emerging operational concepts. Our primary focus is on analysis and experimentation. The integration of various models into our synthetic environments and distributed operations across wide-area networks are crucial to our mission.

Your graduates will help Lockheed Martin implement distributed operations designed to deliver products and services to our customers quicker and with higher quality.

Your MS&E program is crucial to the economic growth of Hampton Roads. DoD's large presence in Hampton Roads requires skilled simulation software engineers. Further, Homeland Defense and Security endeavors require top notch simulation engineers. These engineering positions are well paid and important to the defense of our country.

Sincerely,

Richard C. Marr
Vice President, Center for Innovation
Lockheed Martin Corporation

ALION
SCIENCE AND TECHNOLOGY

BMH Operation, 5365 Robin Hood Road, Suite 100
Norfolk, VA 23513
tel: 757.857.5670 x210   fax: 757.857.6781
jmcginn@alionscience.com   www.alionscience.com

May 1, 2007

Professor Roland R. Mielke, Ph.D.
Modeling and Simulation Program Director
231 Kaufman Hall
Department of Electrical and Computer Engineering
Old Dominion University
Norfolk, Virginia 23529

Dear Professor Mielke:

I am writing to express the support of the BMH Operation of Alion Science and Technology Corp. for Old Dominion University's proposal to establish an undergraduate degree program in Modeling and Simulation Engineering.

Alion is an employee-owned technology solutions company delivering technical expertise and operational support to the Department of Defense (DoD), civilian government agencies, and commercial customers. Alion's multiple business areas include defense operations, modeling and simulation, information technology, wireless communication, industrial technology solutions, chemical, biological and explosive science, and nuclear engineering. The Norfolk-based BMH business-unit has been heavily involved in the development, application, and operation of distributed simulation technologies for DoD warfighter training and experimentation for nearly 20 years.

Much of the experience of our workforce has been through on-the-job training. Until recently, there were scarce educational opportunities in M&S technologies as we know them today. With the advent of the ODU/VMASC Masters and Ph.D. degrees in M&S, Alion-BMH employees have been able to hone their on-the-job experience M&S skills. The proposed undergrad M&SE program will provide a firm foundation to a larger segment of the potential workforce, thereby providing employee candidates with a skill set more suited for our domain from the moment they join the company.

Certainly for Alion and its sister companies, this M&SE program will lead to many M&S employment opportunities in the Hampton Roads and Northern Virginia areas. We would suspect as with most career fields, the academic interests of many young men and women will be driven by job opportunities. This area's preeminence in M&S technologies for DoD, NASA, and local ship building to name a few provides a sound basis for applicability of the same technologies in emerging M&S domains such as medical modeling, emergency management, games for education, visualization, etc. With that growth, jobs will follow and the demand for an educated workforce will follow with it.

Today's M&S workforce is seriously stretched. The needs of tomorrow will far exceed the capacity of the educational system unless we increase throughput today. With arguably the greatest concentration of M&S users in the country located here in the Hampton Roads region and in Virginia in general, this program will fill a key educational void. As the front runner in providing M&S education from undergrad to post-grad, ODU and VMASC will set the pace for the nation while supplying our workforce needs for the future.

Sincerely,

John P. McGinn, Jr.
Vice President, Operation Manager
Alion Science and Technology Corp.
BMH Operation

Memo

To: Professor Roland R. Mielke, Ph.D.
         Modeling and Simulation Program Director
         231 Kaufman Hall
         Department of Electrical and Computer Engineering
         Old Dominion University
         Norfolk, Virginia 23529

Date: 20 April 2007
From: Mark Herman

Dear Professor Mielke:

I am writing to express the support of Booz Allen Hamilton for Old Dominion University's proposal to establish an undergraduate degree program in Modeling and Simulation Engineering.

Booz Allen Hamilton, a global strategy and technology consulting firm, is committed to delivering results that endure. Serving clients on six continents, integrating the full range of consulting capabilities, Booz Allen Hamilton is the one firm that helps government and commercial clients solve their toughest problems. Booz Allen Hamilton's major areas of expertise are Strategy and Leadership, Organization and Change Management, Operations, Innovation, Sales and Marketing, and Information Technology.

Across the 19,000 employee firm, Booz Allen Hamilton leverages Modeling and Simulation (M&S) as a functional skill to benefit all business areas. In recent years, Booz Allen Hamilton has seen a steady increase in demand for skilled M&S professionals in both its commercial and governmental business. Booz Allen Hamilton has a need for entry level employees with M&S skills to serve its growing customer base. Currently there are few if any academic programs capable of providing the undergraduate M&S foundational skill set required by tomorrow's employees.

Thanks to past strategic investments, Virginia, and Hampton Roads in particular, have seen significant grown in M&S as measured by growth in jobs and intellectual capital. The Virginia Modeling Analysis and Simulation Center (VMASC) and United States Joint Forces Command (USJFCOM) have created an M&S center of excellence in the region. There is a definite need for undergraduates in the field of M&S to support this growth. With the help of Old Dominion University and industry partners, these graduates will become the M&S business leaders of tomorrow.

Sincerely,

Mark Herman

NORTHROP GRUMMAN

Northrop Grumman Corporation
Newport News

4101 Washington Avenue
Newport News, VA 23607
Telephone 757-380-2000

July 20, 2007

Professor Roland R. Mielke, Ph.D.
Modeling and Simulation Program Director
231 Kaufman Hall
Department of Electrical and Computer Engineering
Old Dominion University
Norfolk, Virginia 23529

Dear Professor Mielke:

I am writing to express the support of Northrop Grumman Newport News for Old Dominion University's proposal to establish an undergraduate degree program in Modeling and Simulation Engineering. We are very excited to see the development of this program both for our benefit and for the entire Hampton Roads area. Your proposed Modeling and Simulation undergraduate program completes a workforce development educational path for M&S professionals that begins at the high school level and progresses seamlessly through the graduate level.

In my position as director, Education and Workforce Development, for the company, I am responsible for The Apprentice School and for being the sector's point of contact with the broader educational, governmental, and business communities on issues related to workforce development.

Northrop Grumman Newport News is the nation's sole designer, builder and refueler of nuclear-powered aircraft carriers and one of only two companies capable of designing and building nuclear-powered submarines. Newport News also provides after-market services for a wide array of naval and commercial vessels. Newport News employs about 20,000 people, and that includes an engineering workforce in excess of 2,275 individuals. We basically do anything you can imagine from engineering to design to manufacturing to production, and then we follow the ships when they go to sea. In addition, Northrop Grumman has three other of its eight business units headquartered here in Virginia, including Mission Systems, Information Technology, and Technical Services.

We expect to benefit from ODU's Modeling & Simulation program in two major ways. First, our engineering departments will be potential employers of your graduates. As we integrate advanced technologies into our new aircraft carrier construction program (the *Gerald R. Ford* Class) and future evolutions of nuclear-powered submarines in the *Virginia*-Class Submarine Program, expertise in modeling and simulation will play a critical role in our design, manufacturing, and production processes. As well, we envision applications of modeling and simulation in our production planning, labor resource planning, and process improvement programs. Over the past five years, modeling, simulation, and analysis activities at our Virginia Advanced Shipbuilding and Carrier Integration Center have increased from a group of 2 modelers to an organization of 40-plus modelers, programmers, analysts, and network technicians. High levels of growth are expected to continue into the future. The greatest challenge to increased development at Northrop Grumman Newport News is not the lack of customers or work, but the lack of qualified personnel to fill emerging positions. There are virtually no entry level candidates, though numerous entry level positions exist. These positions are currently being filled by senior, overqualified
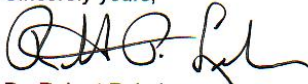
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staff members, because of the lack of a capable entry level workforce. If the modeling and simulation activities are to continue to grow at Northrop Grumman Newport News, a full spectrum of skill levels will be needed, as well as a clearly defined career and advancement path.

Second, the company will be looking to send its Apprentice School graduates to your program for completion of the four-year degree program. In the fall of last year, The Apprentice School initiated a five-year apprenticeship program in Modeling & Simulation, and has enrolled four apprentices to date. Through transfer agreements with Thomas Nelson Community College and Tidewater Community College, these apprentices will complete Associate of Science degrees in engineering during their apprenticeships and be positioned to transfer to Old Dominion University for the four-year degree. A planning team is already in place to ensure this happens, and it includes representatives from Thomas Nelson Community College, Tidewater Community College, Old Dominion University, Northrop Grumman Newport News, The Apprentice School, and NASA – Langley.

Modeling and simulation is an important enabling technology with broad application in many industries, not just shipbuilding. As a result of several recent studies, there is a deep understanding of the Hampton Roads' region's high growth M&S industry. In an effort to identify ways to strengthen the region's economy, a study of the region's M&S industry was conducted in 2004. The study, using a highly conservative definition, pegged the number of direct M&S jobs in the region at 1,659 and projected them to grow 12.3% per year for the next five years. In addition to M&S positions related to training, there are technical professionals in various science, technology, engineering and mathematics fields that build and use engineering-based models and simulations. Clearly, current regional M&S workforce output is insufficient to meet even the projected growth rates, without factoring in attrition of some portion of the labor force and the addition of new demands from regional industries. The Modeling & Simulation program that Old Dominion University is proposing will help fill this gap, especially with its emphasis on a multidisciplinary program. Further, the presence of a bachelor's degree program will stimulate the development of coordinated programs in the high schools and community colleges throughout Hampton Roads.

Thank you, Roland, for the opportunity to comment on your proposal. We're excited about this development and look forward to supporting and working with you.

Sincerely yours,

Dr. Robert P. Leber
Director, Education and Workforce Development
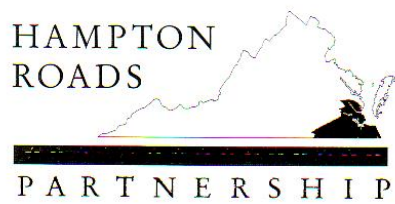
Co-Chairs
Wendy C. Drucker
Thomas R. Frantz

E. Dana Dickens, III
President & CEO

July 26, 2007

Professor Roland R. Mielke, Ph.D.
Modeling and Simulation Program Director
231 Kaufman Hall
Department of Electrical and Computer Engineering
Old Dominion University
Norfolk, Virginia 23529

Dear Professor Mielke:

I am writing to express the Hampton Roads Partnership's support for Old Dominion University's proposed undergraduate degree program in Modeling and Simulation Engineering (M&S). The program is vital to the region's efforts to build this important industry for the benefit of Hampton Roads and the Commonwealth of Virginia.

The Hampton Roads Partnership is a 112 member, public-private organization comprised of the region's top government, business, education, civic, and military leaders. The organization represents ten cities, six counties and one town, which have a combined population exceeding 1.6 million[1]. The Partnership's mission is to provide leadership on those strategic issues that will improve Hampton Roads' competitive position in the global economy. No other organization in Hampton Roads brings together the top government, business, education, military and civic leadership to work on major strategic initiatives.

Specifically, the Partnership's areas of focus include:

- Education - Uniting the region's stakeholders behind efforts to ensure all citizens gain knowledge and life skills required to succeed in the global economy and society.

- Transportation - Advocating for a regional transportation system that enables easy movement of people and goods, efficiently uses land resources, enhances the economy and improves our quality of life.

- Economy - Supporting efforts to improve competitiveness of the Hampton Roads economy, particularly in the areas of port development and M&S.

---

[1] Chesapeake, Franklin, Gloucester, Hampton, Isle of Wight, James City, Newport News, Norfolk, Poquoson, Portsmouth, Smithfield, Southampton, Suffolk, Surry, Virginia Beach, Williamsburg and York.

Professor Roland R. Mielke, PhD.
July 26, 2007
Page 2

Congress has recognized M&S as a National Critical Technology and it has been targeted by the region's leadership as a key industry for development. Perhaps the greatest challenge to the growth of this emerging cluster is the lack of qualified personnel, at the appropriate level of education and training, to fill emerging positions. As such, many positions are filled by senior, over qualified staff members because of the lack of a capable entry level work force. Moreover, M&S academic programs currently exist at the associates and graduate levels. The lack of a Baccalaureate program is a critical gap in the region's workforce development system and Old Dominion's program couldn't come at a better time.

We applaud Old Dominion University's efforts and encourage the appropriate state authorities to approve the Modeling and Simulation Engineering Baccalaureate program.

Sincerely,

E. Dana Dickens, III

Greater Peninsula Workforce Investment Board

July 20, 2007

Professor Roland R. Mielke, Ph.D.
Modeling and Simulation Program Director
231 Kaufman Hall
Department of Electrical and Computer Engineering
Old Dominion University
Norfolk, Virginia 23529

Dear Roland:

Congratulations on the impressive planning and development that went into your proposed undergraduate degree program in Modeling and Simulation Engineering. I appreciate the opportunity to review the program and to lend my personal support as well as the support of the organizations I represent. In my capacity as chairman of the Peninsula Council for Workforce Development and the Greater Peninsula Workforce Investment Board, I want to say that we are very excited to see the development of this program for the benefits it will provide to the entire Hampton Roads area. We fully endorse it.
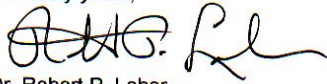
As you know, we just recently received notification that our grant application through WIRED (Workforce Innovation in Regional Economic Development) for the "Southeastern Virginia Partnership for Regional Transformation"(SEVA-PORT) was approved and we were awarded $5 million. The focus of this initiative is to integrate, enhance and build linkages between the emerging industry of Modeling and Simulation (M&S) and the mature and expanding port-related industries of Transportation, Warehousing, and Distribution (TWD). Integrating M&S technologies within existing transportation, warehousing, and distribution industries can improve efficiency and competitiveness while adding high skill, high wage jobs to the region that's home to the nation's 7th largest port in terms of number of containers and 20th in terms of cargo volume. The SEVA-PORT collaborative is a strong regional partnership of over 35 senior-level leaders in economic development, workforce development, civic, business, education, local, state and federal government, entrepreneurial, and philanthropic organizations from the southeastern region of Virginia. This new model of collaboration will be documented in a multi-year transformation process that supports expanding TWD industries and the emerging (M&S) industry. We are counting on Old Dominion University, and its Modeling and Simulation Engineering programs at both the graduate and undergraduate levels, to be a key player in this project.

Modeling and simulation is an important enabling technology with broad application in many industries, not just transportation, warehousing, and distribution. As a result of several recent studies, there is a deep understanding of the Hampton Roads' region's high growth M&S industry. In an effort to identify ways to strengthen the region's economy, a study of the region's M&S industry was conducted in 2004. The study, using a highly conservative definition, pegged the number of direct M&S jobs in the region at 1,659 and projected them to grow 12.3% per year for the next five years. In addition to M&S positions related to training, there are technical professionals in various science, technology, engineering and mathematics fields that build and use engineering-based models and simulations. Clearly, current regional M&S workforce output is insufficient to meet even the projected growth rates, without factoring in attrition of some portion of the labor force and the addition of new demands from regional industries. The Modeling & Simulation program that Old Dominion University is proposing will help fill this gap, especially with its emphasis on a multidisciplinary program. Further, the presence of a bachelor's degree program will stimulate the development of coordinated programs in the high schools and community colleges throughout Hampton Roads.

21 Enterprise Parkway, Suite 200, Hampton, Virginia 23666
(757) 826-3327, 1(800)368-4212, Facsimile (757) 826-6706

Thank you, Roland, for the opportunity to endorse your proposal on behalf of the Peninsula Council for Workforce Development and the Greater Peninsula Workforce Investment Board

Sincerely yours,

Dr. Robert P. Leber
Chairman, Peninsula Council for Workforce Development and
Greater Peninsula Workforce Investment Board

Vice Chairman, Board of Directors, Junior Achievement of Greater Hampton Roads

President-elect, Newport News Educational Foundation

Member, Virginia Workforce Council

Board Member, Virginia Career Education Foundation

Board Member, Future of Hampton Roads

**Modeling and Simulation Engineering
Program Proposal**

**APPENDIX E
STUDENT INTEREST SURVEY DATA**

Dr. Mielke,

Thanks for your interest in our student's career interest. Below is the information you requested of my 36 students.

Bill

ODU Questionnaire:
Dr. Roland Mielke

(1)How many students are interested in pursuing a career in Modeling and Simulation?

(2) How many students' are interested in ODU's proposed M&SE Undergraduate Program?

AM: **19 Students questioned**
        (1) 15 interested in M&S Career
        (2) 11 interested in ODU M&SE 4-year degree

PM: **17 Students questioned**
        (1) 10 interested in M&S Career
        (2) 7 interested in ODU M&SE 4-year degree

Mr. William Jackson
Modeling and Simulation Instructor
Advanced Technology Center
1800 College Crescent
Virginia Beach, VA
23453
757-468-8960 x 51930/7
wsjackso@vbschools.com
http://ee.1asphost.com/wjackson/

Thomas Nelson
COMMUNITY COLLEGE
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Mathematics, Engineering & Technologies Division
99 Thomas Nelson Drive, Hampton, VA 23670 (757) 825-2898
www.tncc.edu/met

Modeling and Simulation Interest Survey

Questions:
  1) Are you interested in pursuing a career in
     Modeling and Simulation?
  2) Are you interested in the proposed M&SE Undergraduate Program at ODU?

Course	Course Title	# Students Responding "Yes" to Question #1	# Students Responding "Yes" to Question #2
EGR 110	Engineering Graphics	17	17
EGR 120	Introduction to Engineering	2	2
EGR 126	Computer Programming for Engineers	8	5
EGR 140	Engineering Mechanics-Statics	2	1
EGR 250	Electrical Theory	1	1
EGR 261	Signals & Systems	1	1
EGR 277	Digital Logic	1	1
EGR 278	Digital Logic Laboratory	1	1
MTH 163	Precalculus I	14	6
MTH 164	Precalculus II	11	8
MTH 173	Calculus with Analytic Geometry I	15	14
MTH 291	Differential Equations	5	5
	Totals	**78**	**62**

Data Source: Dr. Patricia Taylor
         Dean, Mathematics, Engineering & Technologies
         Thomas Nelson Community College

Engineering and Industrial Technologies Division
Virginia Beach Campus
1700 College Crescent
Virginia Beach, VA 23453

Modeling and Simulation Interest Survey
Spring 2008

Questions:

1) How many students are interested in pursuing a career in Modeling and Simulation?

2) How many students would be interested in completing an Associate degree in M&S at Tidewater Community College?

3) How many students are interested in continuing their education after graduation to obtain a Bachelor's degree in M&S from ODU?

Course	Course Title	# Students Responding "Yes" to Questions #1, #2 and #3	# of Students Questioned Responding "No"
EGR 120	Introduction to Engineering	12	58

Data Source: Dr. Brenda Sedlacek
　　　　　　　Dean, Engineering and Industrial Technologies
　　　　　　　Tidewater Community College-Virginia Beach