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| For Academic Affairs and Research Use Only | |
| Proposal Number |  |
| CIP Code: |  |
| Degree Code: |  |

**New or Modified Course Proposal Form**

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

|  |
| --- |
| **[X]New Course, [ ]Experimental Course (1-time offering), or [ ]Modified Course (Check one box)** |

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

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| Andre Possani Espinosa 9/23/2021 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Andre Possani Espinosa 9/23/2021 **Department Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (if applicable)** |
| Jason Stewart 9/24/2021  **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| Mary Elizabeth Spence 9/29/2021 **Office of Assessment (new courses only)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Graduate Curriculum Committee Chair** |
| Abhijit Bhattacharyya 9/24/2021 **College Dean** | Alan Utter 10/11/2021  **Vice Chancellor for Academic Affairs** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **General Education Committee Chair (if applicable)** |  |

1. **Contact Person (Name, Email Address, Phone Number)**

Andre Possani Espinosa, [apossaniespinosa@astate.edu](mailto:apossaniespinosa@astate.edu), +52 419 689 0354 ext. 2061

1. **Proposed starting term and Bulletin year for new course or modification to take effect**

FALL 2022

**Instructions:**

*Please complete all sections unless otherwise noted. For course modifications, sections with a “Modification requested?” prompt need not be completed if the answer is “No.”*

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|  | **Current (Course Modifications Only)** | **Proposed (New or Modified)**  *(Indicate “N/A” if no modification)* |
| **Prefix** |  | **MSE** |
| **Number\*** |  | **4533** |
| **Title** |  | **Computational Fluid Mechanics** |
| **Description\*\*** |  | **Formulation and application of finite difference methods for solving fluid flow problems. Classification of partial differential equations and formulation of well-posed problems. Discrete approximation of partial differential equations: stability, consistency, and convergence. Finite-volume formulations. Application of methods to flow problems.** |

***\**** (Confirm with the Registrar’s Office that number chosen has not been used before and is available for use. For variable credit courses, indicate variable range. *Proposed number for experimental course is 9*. )

\*\*Forty words or fewer as it should appear in the Bulletin.

1. **Proposed prerequisites and major restrictions** **[Modification requested? No]**

(Indicate all prerequisites. If this course is restricted to a specific major, which major. If a student does not have the prerequisites or does not have the appropriate major, the student will not be allowed to register).

1. **Yes / No** Are there any prerequisites? Yes
   1. If yes, which ones?

C or better in ENGR 3473

* 1. Why or why not?

Requires knowledge of fluid mechanics.

1. **Yes / No** Is this course restricted to a specific major? No
   1. If yes, which major? Enter text...
2. **Proposed course frequency [Modification requested? No]**

(e.g. Fall, Spring, Summer; if irregularly offered, please indicate, “irregular.”) *Not applicable to Graduate courses.*

Irregularly

1. **Proposed course type [Modification requested? No]**

Will this course be lecture only, lab only, lecture and lab, activity (e.g., physical education), dissertation/thesis, capstone, independent study, internship/practicum, seminar, special topics, or studio? Please choose one.

Lecture only

1. **Proposed grade type [Modification requested? No]**

What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental, or other [please elaborate])

Standard letter

1. No Is this course dual-listed (undergraduate/graduate)?
2. No Is this course cross-listed?

*(If it is, all course entries must be identical including course descriptions. Submit appropriate documentation for requested changes. It is important to check the course description of an existing course when adding a new cross-listed course.)*

**a.** – If yes, please list the prefix and course number of the cross-listed course.

Enter text...

**b.** – **Yes / No** Can the cross-listed course be used to satisfy the prerequisite or degree requirements this course satisfies?

Enter text...

1. Yes Is this course in support of a new program?

a. If yes, what program?

BS in Mechanical Systems Engineering,

1. No Will this course be a one-to-one equivalent to a deleted course or previous version of this course (please check with the Registrar if unsure)?

a. If yes, which course?

Enter text...

**Course Details**

1. **Proposed outline** **[Modification requested? No]**

(The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)

Week 1: Introduction to Computational Fluid Dynamics

Week 2: Governing Equations for Fluid Flow and Heat Transfer

Week 3: Differential and Integral Form for General Transport Equations

Week 4: Classification of Methods for simple PDEs

Week 5: Finite Volume for Diffusion Problems: 1D Problems

Week 6: Finite Volume for Diffusion Problems: 2D Problems

Week 7: Finite Volume for Convection Diffusion Problems: 1D steady state problems

Week 8: Finite Volume for Convection Diffusion Problems: Central Difference Scheme

Week 9: Finite Volume for Convection Diffusion Problems: Upwind scheme

Week 10: Solution algorithms for pressure velocity coupling in steady flows

Week 11: Solution algorithms for pressure velocity coupling in steady flows

Week 12: Solution Algorithms for Discretized Equations

Week 13: Solution Algorithms for Discretized Equations

Week 14: Unsteady Flows and Boundary Conditions

Week 15: Unsteady Flows and Boundary Conditions

1. **Proposed special features** **[Modification requested? No]**

(e.g. labs, exhibits, site visitations, etc.)

No

1. **Department staffing and classroom/lab resources**

No

1. Will this require additional faculty, supplies, etc.?

No

1. No Does this course require course fees?

*If yes: please attach the New Program Tuition and Fees form, which is available from the UCC website.*

**Justification**

**Modification Justification (Course Modifications Only)**

1. Justification for Modification(s)

Enter text...

**New Course Justification (New Courses Only)**

1. Justification for course. Must include:

a. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain)

Students will learn the formulation and application of finite difference methods for solving fluid flow problems. Classification of partial differential equations and formulation of well-posed problems. Discrete approximation of partial differential equations: stability, consistency, and convergence. Finite-volume formulations. Application of methods to 2D flow problems

b. How does the course fit with the mission of the department? If course is mandated by an accrediting or certifying agency, include the directive.

This course contributes to ABET’s student outcome 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

c. Student population served.

Mechanical Systems Engineering students at ASUCQ.

d. Rationale for the level of the course (lower, upper, or graduate).

Upper level because it requires knowledge from lower-level courses.

**Assessment**

**Assessment Plan Modifications (Course Modifications Only)**

1. **Yes / No** Do the proposed modifications result in a change to the assessment plan?

*If yes, please complete the Assessment section of the proposal*

**Relationship with Current Program-Level Assessment Process (Course modifications skip this section unless the answer to #18 is “Yes”)**

1. What is/are the intended program-level learning outcome/s for students enrolled in this course? Where will this course fit into an already existing program assessment process?

This course is an elective course in the degree plan and won’t be used for direct assessment. This course contributes to PLO 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

1. Considering the indicated program-level learning outcome/s (from question #19), please fill out the following table to show how and where this course fits into the program’s continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

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| **Program-Level Outcome 1 (from question #19)** | An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. |
| Assessment Procedure Criterion | Indirect Assessment  Surveys of graduating seniors (each semester)  Surveys of Alumni (every two years)  Surveys of Employers (every two years)  Direct Assessment  - 90% of students will score 3.0 or higher on portfolio evaluations (graded work, exams, papers, etc.) performed by faculty from the following course:  ME 3613 Control Systems for Mechanical Engineers |
| Which courses are responsible for this outcome? | ME 3613 |
| Assessment  Timetable | Collect data whenever ME 3613 is offered. Assess every 3 years according to the College of Engineering and Computer Science assessment schedule. |
| Who is responsible for assessing and reporting on the results? | Indirect assessment: the Director of Engineering at campus Queretaro.  Direct assessment: the Professor who teaches ME 3613. |

*(Repeat if this new course will support additional program-level outcomes)*

**Course-Level Outcomes**

1. What are the course-level outcomes for students enrolled in this course and the associated assessment measures?

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| **Outcome 1** | Student will learn about Computational Fluid Mechanics |
| Which learning activities are responsible for this outcome? | In-class discussion and illustrations  Demonstration of analysis results in presentations |
| Assessment Measure | Course presentations, exams and projects |

*(Repeat if needed for additional outcomes)*

**Bulletin Changes**

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| **Instructions** |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Please include a before (with changed areas highlighted) and after of all affected sections.**  **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.** |

**Page 552, before the heading “Military Science and Leadership (MSL)”**

**Before:**

**MLED 4116. Teaching Internship II** Directed teaching under the supervision of a qualified

teacher in an appropriate area of specialty. Prerequisites, Admission into Teacher Education

Program, MLED 4042, MLED 4006, Two of the following specialty courses, MLED 4002, MLED

4012, MLED 4022, MLED 4032. Spring.

**Military Science and Leadership (MSL)**

**MSL 1011. Introduction to the Army and Critical Thinking** Examines the unique duties

and responsibilities of officers. Discuss organization and role of the Army. Review basic

life skills pertaining to fitness and communication. Analyze Army values and expected ethical

behavior.

**After:**

**MLED 4116. Teaching Internship II** Directed teaching under the supervision of a qualified

teacher in an appropriate area of specialty. Prerequisites, Admission into Teacher Education

Program, MLED 4042, MLED 4006, Two of the following specialty courses, MLED 4002, MLED

4012, MLED 4022, MLED 4032. Spring.

**Mechanical Systems Engineering (MSE)**

**MSE 4533 Computational Fluid Mechanics.** Formulation and application of finite difference methods for solving fluid flow problems. Classification of partial differential equations and formulation of well-posed problems. Discrete approximation of partial differential equations: stability, consistency, and convergence. Finite-volume formulations. Application of methods to flow problems. Prerequisite: C or better in ENGR 3473.

**Military Science and Leadership (MSL)**

**MSL 1011. Introduction to the Army and Critical Thinking** Examines the unique duties

and responsibilities of officers. Discuss organization and role of the Army. Review basic

life skills pertaining to fitness and communication. Analyze Army values and expected ethical

behavior.