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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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| Ilwoo Seok 3/16/2022 **Department Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **COPE Chair (if applicable)** |
| Shivan Haran 3/16/2022 **Department Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Head of Unit (if applicable)** |
| Jason Stewart 3/23/2022  **College Curriculum Committee Chair** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Undergraduate Curriculum Council Chair** |
| Mary Elizabeth Spence 3/17/2022 **Director of Assessment (new courses only)** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **Graduate Curriculum Committee Chair** |
| Abhijit Bhattacharyya 2/20/2023 **College Dean** | Len Frey 3/22/2023  **Vice Chancellor for Academic Affairs** |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enter date…  **General Education Committee Chair (if applicable)** |  |

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

**Drew Fleming;** [**rofleming@AState.edu**](mailto:rofleming@AState.edu)**; (870) 972-3743,**

**Ilwoo Seok:** [**iseok@astate.edu**](mailto:iseok@astate.edu)**; (870) 680-8589**

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

**Spring 2023; 2022-23 Bulletin**

**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** |  | **ME** |
| **Number\*** |  | **3503** |
| **Title**  (include a short title that’s 30 characters or fewer) |  | **Introduction to Materials Science**  **(Intro. To Materials Science)** |
| **Description\*\*** |  | **Properties and applications of engineering materials, including metals, ceramics, polymers, and composites. Emphasis on the atomic structure of matter, crystal structures, and defects, and an introduction to structure-property-processing relationships.** |

***\**** 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 (excepting prerequisites and other restrictions) as it should appear in the Bulletin.

1. **Proposed prerequisites and major restrictions** **[Modification requested? Yes/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** Are there any prerequisites?
   1. If yes, which ones?

Corequisite: ENGR 2413 Mechanics of Materials

* 1. Why or why not?

Corequisite requirement ensures proper sequencings with the solid mechanics curriculum. Subsequent development of strength of materials concepts (in ENGR 2413) supports and motivates the role of atomic structure and defects on material properties.

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

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

**Spring**

1. **Proposed course type [Modification requested? Yes/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? Yes/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. **NO** Is this course in support of a new program?

a. If yes, what program?

Enter text...

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: Atomic structure of materials, covalent and ionic bonding, cohesive energy of solids**

**Week 2: Crystal structures and lattices, Miller indices for directions and planes**

**Week 3: Point defects in solids, diffusion (Fick’s Laws)**

**Week 4: Mechanical properties of metals**

**Weeks 5-6: Dislocations and solid-strengthening mechanisms**

**Weeks 7-8: Phase diagrams and phase transformations**

**Week 9: Applications and processing of metal alloys**

**Weeks 10-11: Structure, properties, and processing of ceramics**

**Weeks 12-13: Structure, properties, and processing of polymers**

**Week 14: Composite materials**

**Week 15: Thermal and electrical properties of materials**

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

**Guest speakers from industry: glass and metallurgy**

**Potential site visits to local steel and casting companies**

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

Class can be offered as part of the existing faculty teaching load; sufficient classroom space is available.

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

**Course topics provide a broad introduction to materials and materials science, which are a dedicated section of the Mechanical Engineering *Fundamentals of Engineering* Exam. Currently, many of these course topics are only tangentially covered in another course. The course will emphasize the role of materials and material selection in engineering applications, and further support course topics in the following course: ME 4543 Machine Design, ME 4573 Mechanical System Design, ME 3504 Process Monitoring & Control, and ME 4453 Heat Transfer**.

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

**The course addresses fundamental materials science topics that are considered “standard” for mechanical engineering programs. The College also is developing a new emphasis on materials to better serve the needs of local employers, and this course will be a cornerstone of that effort.**

1. Student population served.

**BS students in Engineering and Engineering Technology programs.**

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

**Course topics are sufficiently advanced to be an upper-level course. The design of a 3000-level is appropriate since it supports courses at the 4000-level.**

**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?

**The course will address ABET Outcome No. 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics**

**As this outcome is already assessed by other courses (ENGR 4463 and ME 3504), this course will not be a part of the existing program assessment process**

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)** | **ABET Outcome No. 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics** |
| Assessment Measure | 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 3504 Process Monitoring and Control * Average score on questions related to engineering, science, and mathematics from the real or practice FE exam will equal or exceed the global average for the questions for ME students |
| Assessment  Timetable | 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? | Chair for the outcome 1 committee is responsible for assessing, evaluating and analyzing results, and developing action plans |

*(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** | **Understanding and appreciation for the role/limitations of materials in engineering applications.** |
| Which learning activities are responsible for this outcome? | **Lectures and classroom discussion,**  **Inviting presentation - Guest speakers** |
| Assessment Measure | Course Grades |

*(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.** |

**From Programs A-Z, Mechanical Engineering**

***Before***

**ME Electives**

\**(Students must select six (6) credit hours from the following approved ME Electives):*

* [ME 3523 - Introduction to Robotics Laboratory](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4523 - Introduction to Finite Element Analysis](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4583 - Energy Conversion](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4593 - Design of Heating, Ventilating, and Air-Conditioning Systems](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**

***After***

**ME Electives**

\**(Students must select six (6) credit hours from the following approved ME Electives):*

* **ME 3503 – Introduction to Materials ScienceSem. Hrs: 3**
* [ME 3523 - Introduction to Robotics Laboratory](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4523 - Introduction to Finite Element Analysis](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4583 - Energy Conversion](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**
* [ME 4593 - Design of Heating, Ventilating, and Air-Conditioning Systems](https://catalog.astate.edu/preview_program.php?catoid=3&poid=546&returnto=75) **Sem. Hrs:** **3**

**From Course Descriptions**

***Before***

|  |  |
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| **Mechanical Engineering** | |
|  | •  [ME 469V - Special Problems in Mechanical Engineering](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4940) **Sem. Hrs:** **Variable** |
|  | •  [ME 2502 - Solid Modeling for Mechanical Engineers](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4925) **Sem. Hrs:** **2** |
|  | •  [ME 3513 - Mechanical Vibrations](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4927) **Sem. Hrs:** **3** |
|  | •  [ME 3523 - Introduction to Robotics Laboratory](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4928) **Sem. Hrs:** **3** |

***After***

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| **Mechanical Engineering** | |
|  | •  [ME 469V - Special Problems in Mechanical Engineering](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4940) **Sem. Hrs:** **Variable** |
|  | •  [ME 2502 - Solid Modeling for Mechanical Engineers](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4925) **Sem. Hrs:** **2** |
|  | [ME 3503 – Introduction to Materials Science](https://catalog.astate.edu/content.php?filter%5B27%5D=ME&filter%5B29%5D=&filter%5Bcourse_type%5D=-1&filter%5Bkeyword%5D=&filter%5B32%5D=1&filter%5Bcpage%5D=1&cur_cat_oid=3&expand=&navoid=78&search_database=Filter)   |  | | --- | | [Print (opens a new window)](javascript:acalogPopup('preview_course.php?catoid=3&coid=4927&print',%20'preview_course',%20770,%20530,%20'yes')) ME 3503 – Introduction to Materials Science **Sem. Hrs:** **3**  Properties and applications of engineering materials, including metals, ceramics, polymers, and composites. Emphasis on the atomic structure of matter, crystal structures, and defects, and an introduction to structure-property-processing relationships. Spring.   **Corequisite:** [ENGR 2413](https://catalog.astate.edu/content.php?filter%5B27%5D=ME&filter%5B29%5D=&filter%5Bcourse_type%5D=-1&filter%5Bkeyword%5D=&filter%5B32%5D=1&filter%5Bcpage%5D=1&cur_cat_oid=3&expand=&navoid=78&search_database=Filter#tt7189). | |
|  | •  [ME 3513 - Mechanical Vibrations](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4927) **Sem. Hrs:** **3** |
|  | •  [ME 3523 - Introduction to Robotics Laboratory](https://catalog.astate.edu/preview_course_nopop.php?catoid=3&coid=4928) **Sem. Hrs:** **3** |