### Catalog Description
EGR 386W - Engineering Design: The Methods (3). Methods of engineering design, including project planning and management, effective multi-disciplinary team skills, professional writing, oral communication skills, and professional ethics. 3 hr. lecture. Fee required. Fall, Spring. JWRT

### Prerequisites
EGR 286 and ENG 105 with a grade of a “C” or better.

### Section Information
- EGR 386-6, TuTh 9:35 AM – 10:50 AM
- EGR 386-4, TuTh 12:45 PM – 2:00 PM

### Instructor Information
- David Richter, Design4Practice & Mechanical Engineering
  - Office: Room 216; david.richter@nau.edu
  - Office Hours: MoWe 12:30-2:00 and TuTh 2:30-4:00
    - or by appointment (scheduled at least 24 hours in advance)

### TA Information
- Hannah Verk, Stephanie Flood
  - Office: TBD
  - Office Hours: TBD

### Learning Outcomes
At the conclusion of the course it is expected that each student will be able to (ABET learning outcomes are in parenthesis):

1. Describe the design process steps and the activities and results that are typical of each step. Apply the design process to a contemporary design problem, recognizing broader constraints and impacts of the design (c)
2. Work effectively with other majors as a team of diverse individuals (d).
3. Communicate effectively in teams and in presentations (g), and develop technical writing skills that allow them to communicate effectively in writing (g, i)
4. Recognize and analyze ethical issues; apply professional standards to determine appropriate action (f).

### Textbook
None; any readings will be provided on Bb Learn.

### Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Important Dates</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro and class organization</td>
<td>1/13 – classes begin</td>
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<tr>
<td>2</td>
<td>Engineering employment topics</td>
<td>1/20 – MLK Day holiday</td>
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<tr>
<td>3</td>
<td>Teaming and the Design Process</td>
<td>1/23 – last day to add/drop</td>
</tr>
<tr>
<td>4</td>
<td>Requirements gathering and organizing</td>
<td>1/24 - last day drop with “W”</td>
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<tr>
<td>5</td>
<td>Idea Conception</td>
<td>2/3 – administrative drop deadline</td>
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<tr>
<td>7</td>
<td>Project Management</td>
<td>4/25 – last day to officially withdraw from the University</td>
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<tr>
<td>8</td>
<td>Team Presentations</td>
<td>5/2 – last day of instruction</td>
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<tr>
<td>9</td>
<td>Spring Break</td>
<td>5/5 – 5/8 - Finals</td>
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<tr>
<td>10</td>
<td>Cost Analysis / Budgeting</td>
<td></td>
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<tr>
<td>11</td>
<td>Engineering Economics</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Final Projects Overview</td>
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</tbody>
</table>
### Learning Activities

1. Define the design project problem.
2. Research and document other solutions, technologies, parts and tools needed for the design process.
3. Create and describe requirements, constraints and specifications for a design project.
4. Choose a design concept and write a comprehensive design proposal and other reports as required.
5. Learn and apply effective team dynamics to work together on teams while managing the design process and project.
6. Communicate with clients, vendors, faculty and industry experts.
7. Present your design research, progress and activities during design reviews orally and in written reports.
8. Learn and apply principles of effective technical writing to produce clear, concise, grammatically correct, well-organized, well-written memos, proposals and reports.
9. Apply ethical principles and standards to an ethical issue and write an extensive report.

### Assessment

You will be evaluated on the learning objectives (listed above), according to the following weighting:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Individual assignments</td>
<td>40%</td>
</tr>
<tr>
<td>Team assignments</td>
<td>45%</td>
</tr>
<tr>
<td>Team meetings/agendas</td>
<td>5%</td>
</tr>
<tr>
<td>Logbook</td>
<td>5%</td>
</tr>
<tr>
<td>Class participation/attendance</td>
<td>5%</td>
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</tbody>
</table>

### Attendance & Class Participation

- Attendance is mandatory. Attendance and participation will be evaluated through completion of in-class activities, team minutes, and/or submission of quizzes.
- Additional information about the attendance and tardiness policies are provided below.

### Homework & Quizzes

- Individual homework assignments will be assigned periodically throughout the semester to reinforce the material presented in class. **Both an electronic and hardcopy format of homework may be required.**
  - When electronic homework is required, it must be submitted on Bb Learn in (.pdf, .doc, .docx) format by the specified deadline.
  - When a hardcopy of homework is required, it will be collected within the first five minutes of the class period it is due.
- Quizzes may be given periodically to evaluate your understanding of the material and preparedness for class. If you are not in class when a quiz is handed out, you may not take the quiz at another time.

### Design Projects

A single major project is assigned for the semester. For this team project, you will complete one or more confidential evaluations of your teammates on participation and contributions in the accomplishments of project tasks. Project grades will be adjusted based on these peer evaluations. Thus, even though a team project might receive an excellent grade, individual members may receive a lower grade depending upon an individual’s lower participation.
Final Exam

The final exam is the Final Project Proposal Report, due during finals week.

Grading System

Final grades will be assigned using the following scale:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Numeric Grade</th>
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<tbody>
<tr>
<td>A</td>
<td>90 to 100</td>
</tr>
<tr>
<td>B</td>
<td>80 to 89</td>
</tr>
<tr>
<td>C</td>
<td>70 to 79</td>
</tr>
<tr>
<td>D</td>
<td>60 to 69</td>
</tr>
<tr>
<td>F</td>
<td>59 or below</td>
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</table>

Course Policies

Professional engineers must abide by workplace policies, and similarly as an engineering student, you must abide by academic (http://nau.edu/Student-Life/Student-Handbook/Academic-Policies/) and course policies.

Use of Electronic Devices and Computers During Class

Any and all electronic devices are to be turned off and placed either in a backpack or purse. As such, all electronic devices are not allowed on desks or tables and are not to be used for any purpose during class. Such devices are disruptive and not conducive to learning. Laptop computers and tablet devices are to be used only to take class notes. They are not to be used for any activities unrelated to class (for example, checking emails or working on assignments). A student ignoring this protocol will be required to leave the class. Repeated occurrences will result in the student being dropped from the course.

Work

- *All assignments must be neatly presented.*
- Every assignment must contain a header consisting of your name, due date, a descriptive title, and EGR386-# (with # replaced with your section number). Team assignments also must include your team number or team name.
- If the assignment requires a problem solution, it may be accomplished initially in pencil on engineering paper if the assignment allows it. All other components of assignments must be produced using a word processor, spreadsheet program, or other computer software.
- Any homework that is not professionally presented will be returned with a grade of zero.
- As a general rule, you are expected to work two hours outside of class for every hour in class. For a three unit class, this means that you can expect to work six hours a week outside of the classroom.

Late Work

- *Late homework and projects are not accepted.* All assignments are due at their due dates and times. Late assignments are assigned a grade of zero, unless a late penalty is documented in writing by the assignment.

Plagiarism and Cheating

- You are expected to behave professionally during this course. This means that individual coursework will be completed individually. You are encouraged to discuss assignments, but you may not submit another’s work as your own.
- On all assignments, any sources of information that are not the original creation of the author must be cited in sufficient detail that the instructor can locate and verify the sources.
- If you are repeating this class, you may not use work that you completed for a previous class. Plagiarism and cheating are subject to the Arizona Board of Regents Code of Conduct procedures as outlined in the NAU Student Handbook.

<table>
<thead>
<tr>
<th>University Policies</th>
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| Please review the following NAU Academic Policy Statements ([http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html](http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html)):
  - Safe Environment Policy
  - Students With Disabilities
  - Institutional Review Board
  - Academic Integrity
  - Academic Contact Hour Policy
  - Sensitive Course Materials

NAU Classroom Disruption Policy: [http://nau.edu/uploadedFiles/Administrative/EMSA_Sites/Folder_Templates/_Forms/Classroom_Disruption_Policy.pdf](http://nau.edu/uploadedFiles/Administrative/EMSA_Sites/Folder_Templates/_Forms/Classroom_Disruption_Policy.pdf)

Revised Professional Code of Ethics statement: [http://nau.edu/uploadedFiles/Academic/CEFNS/Forms/engineering%20students%20professional.pdf](http://nau.edu/uploadedFiles/Academic/CEFNS/Forms/engineering%20students%20professional.pdf)


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<th>About the Design4Practice (D4P) Program</th>
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<tr>
<td>The Design4Practice (D4P) Program consists of a sequence of design courses that span the freshman to senior years in all engineering degree programs at NAU. The D4P courses are designed to prepare students for an engineering corporate environment, which requires the synthesis of technical knowledge and skills as well as a proficiency in a variety of professional skills. The four “pillars” of the D4P Program are: 1) Engineering Design, 2) Communication, 3) Teamwork, 4) Professionalism.</td>
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**D4P Courses:**
- EGR 186 – Introduction to Engineering Design
- EGR 286 – Engineering Design: The Process; CENE 286– Civil And Environmental Engineering Design: The Process
- EGR 386W – Engineering Design: The Methods
- Capstone courses: CENE 476 & 478C, EE 476C & 486C, ME 476C & 486C