Course Vision

To inculcate an appreciation of the social change that Engineering creates, and how not only for-profit enterprises but also non-profit organizations and philanthropy act as catalysts. Students will appreciate that there is more to engineering than just “engineering” and be inspired to use their skills and mindset to practice social entrepreneurship.

Course Introduction

We are facing growing social and environmental challenges in our world where the solutions are not profitable financially but create significant social benefit and change. We must therefore create an environment where engineers have not only a social awareness, but also the skills and knowledge to build, work in and/or direct organizations where maximizing profits will also include maximizing worker, society and environmental benefits.

There are many examples of organizations involved in engineering, social change and philanthropy. Engineering for Change (E4C) and Engineers Without Borders (EWB) are good examples of nonprofit organizations directly involved in allowing engineers to use their skills in philanthropic ways. There are many major corporations including Palantir, General Electric, Alcoa, Google, and many others who are quite active in philanthropic work and have significant budgets to support these activities. Organizations such as the Gates Foundation utilize engineers with wide-ranging skillsets to take on significant global issues with aggressive goals, as do the U.N., RAND Corporation, the World Bank and others. There are an estimated 2.3 million operating nonprofits in the U.S., employing approximately 13.7M workers, which represents 10% of the nation’s workforce. Consequently, engineers have a significant role to play in this environment.

Many engineering students are already interested in and excited by the possibilities of putting their developing engineering skills to use in ways that benefit humanity without financial gain, and that interest will continue throughout their careers. In recognition of this, we are offering this course in which students will:

- Understand the interaction between engineering, social change and philanthropy, and how organizations engage in these activities.
- Articulate their view and philosophy of engineering as it creates social change.
- Practice leadership, teamwork, entrepreneurial skills and decision making by awarding a significant financial contribution to a nonprofit foundation.
- Practice the art of multi optimization in an environment with severe cost restraints to support underfunded projects of significant social value.

An integral part of this course is student participation. Students will be required to take part in impromptu group discussions, team exercises and decision-making not only in the classroom, but also outside. Students will engage with on-campus and external organizations and their representatives as part of the process of evaluation and grant-making, and at the end of the semester, the students will make formal presentations in support of an idea for social change they believe can be successful.

Course Components
The course is comprised of the following main components:

1. **Engineering and Social Change Lectures**

   We have selected a number of highly technical topics of contemporary interest that have significant engineering content that creates social change. Students will hear lectures from associated faculty on issues of current interest in the area of Engineering and Social Change. Topics covered are at the intersection of engineering, technology and society and include philanthropy, autonomy, sustainability, energy efficiency, low cost engineering, design using crowdsourcing and the future of engineering among others. We will also include a series of guest speakers of significant reputation in their fields, such as those hosted from the Gates Foundation and USAID in previous semesters, and these speakers will vary each semester.

2. **$10,000 Neilom Engineering for Social Change Grant**

   Students will go through the rewarding process of granting $10,000 to a local nonprofit organization of their choice from a group of non-profit organizations. We have vetted and selected ten non profits who are working in areas worthy of support and working in areas that have significant social impact. Each team will select one of these nonprofit organizations working in an area of interest to the team. The team will collect substantial information on their non-profit organization including history, mission statement, measures of success, budget, infrastructure, etc. and prepare a presentation of why the organization should be given a grant. The students will gather pertinent information from both phone interviews and site visits, partially outside of class hours, to their selected nonprofit organization and prepare a formal presentation. For further details, see the ESC Grant - All You Need to Know package, which will be provided on Canvas. The teams will then make their presentation to the entire class. At the end of the course the class will select through technical analysis, discussion and voting the winning non-profit organization that will receive the $10,000 grant. This grant money comes from a generous contribution by the Neilom Foundation. A final grant award ceremony will be held at the end of the semester.

3. **The ESC Scholarly Paper**

   Each team will write a scholarly paper critically reviewing lasting and significant social change discussed in one of the lecture topics of their choice. Students will start with the material discussed in the lecture and critically discuss the impact it has had on social change. For further details, see the ESC Scholarly Paper - All You Need to Know package, which will be provided on Canvas.

4. **The ESC Ethics Paper**

   Each student will write a paper on ethics. They will select a topic of their own and after approval by the instructor will discuss ethics and social change. For further details, see the ESC Ethics Paper - All You Need to Know package, which will be provided on Canvas.

5. **Blog**

   Students are required to write one public blog post on the class blog (see Canvas for details) in the last week of the semester describing their experience and how this course has changed, or impacted their views on engineering and social change.
6. Grant Ceremony

At the end of the semester students will be required to attend the grant ceremony. Each team will prepare a poster summarizing their scholarly work and will make a 5-minute presentation to the guests. During the grant ceremony the main grant award will be made to the successful nonprofit as chosen by the students. The final celebration concludes with a reception for the guests and students.

What Will You Learn?:

- Learn about selected contemporary technical areas and their impact on social change.
- They learn to analyze in depth the contributions of these technologies to social change and prepare a scholarly paper.
- Learn how to put together a compelling story/presentation in a competitive environment.
- Learn to work and interact with an outside non-profit entity engaged in using engineering create social change in the area of their interest.
- Learn team-based decision-making with a significant real-world fiscal responsibility.

Course Topics include:

- Philanthropy
- Autonomy
- Robotics
- Big Data
- Climate Change
- Low Cost Engineering
- Ethics

Learning Outcomes (ABET)

- An understanding of professional and ethical responsibility.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- Knowledge of contemporary issues.
- Ability to design a process to meet desired needs within realistic constrains such as economic, environmental, social, political ethical, health and safety and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An ability to communicate effectively.
- A recognition of the need for, and an ability to engage in life-long learning.
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Number of credits: 3

Prerequisites

Academic Standing: Students with sufficient credit for junior standing or permission of the Mechanical Engineering Department.
Course duration

Fall 2016, August 29th to December 12th, Celebration date TBD.

Class hours

Mondays and Wednesdays 2:00 – 3:15 pm, ITV Room 1111.

Course Instructors

Professor Davinder K. Anand: Course Leader
Center for Engineering Concepts Development (CECD), Department of Mechanical Engineering, A. James Clark School of Engineering
dkanand@umd.edu, 301-405-5294, Room 3120, Glenn L. Martin Hall.

Mr. Dylan Hazelwood: Course Manager
Center for Engineering Concepts Development (CECD), Department of Mechanical Engineering, A. James Clark School of Engineering
dylan@umd.edu, 301-405-5434, Room 2142, Glenn L. Martin Hall.

Dr. Robert Grimm: Course Instructor
Center for Philanthropy and Nonprofit Leadership (CPNL), School of Public Policy
rgrimm@umd.edu, 301-405-2186, 3105 Van Munching Hall.

Dr. Jennifer Littlefield: Course Instructor
Center for Philanthropy and Nonprofit Leadership (CPNL), School of Public Policy
jnlittle@umd.edu, 301-405-4765, 1108 Taliaferro Building.

Dr. Mukesh Kapilashrami: Course Instructor
Center for Engineering Concepts Development (CECD), Department of Mechanical Engineering, A. James Clark School of Engineering
mukes@umd.edu, 301-405-8733, Room 2142, Glenn L. Martin Hall.

Invited Faculty will also deliver lectures in this course.

Office Hours

Official office hours are in the Center for Engineering Concepts Development Office, Room 2142, Glenn L. Martin Hall, Monday/Wednesday at 3:30 – 5:00 pm. Other hours are by appointment; contact the Course Manager at dylan@umd.edu.

Textbook

The readings for the course are available through Canvas, or are freely available on the Internet. Case studies will be paid for and provided free of charge for students by the Center for Engineering Concepts Development (CECD) in the Department of Mechanical Engineering.

Course Website

Course announcements and all relevant information will be sent through Canvas, UMD’s learning
management system.

**Course Elements and Grading**

<table>
<thead>
<tr>
<th>Course Element</th>
<th>Score</th>
<th>Assignment type</th>
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<tbody>
<tr>
<td>Attendance</td>
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<tr>
<td>Scholarly Paper</td>
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<td>Individual</td>
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<tr>
<td>Final Presentation</td>
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<td>Group</td>
</tr>
<tr>
<td>Ethics Paper [mid term]</td>
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<td>Individual</td>
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<td>Blog</td>
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**Engineering for Social Change Office (ESC)**

The Engineering for Social Change Office is a meeting room and office in Room 2142 in Glenn L. Martin Hall where students are encouraged to stop by for informal/formal discussions on all aspects of the course throughout the semester.

**Exams**

There will be a midterm exam representing 20% of the total grade, and the final exam at the end of the semester is comprised of two parts: (i) a written report of the scholarly paper, and (ii) a group paper and presentation of the grant project.

**Course Etiquette**

Attendance to both Monday and Wednesday classes is **required**. In lectures and discussions we expect students to listen and respond to their peers respectfully. We request that students to not use electronic devices unless relevant to the coursework or requested during the class period.

**Academic Integrity**

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit: [http://www.studenthonorcouncil.umd.edu/whatis.html](http://www.studenthonorcouncil.umd.edu/whatis.html).

Students are responsible for knowing, understanding, and behaving according to the content of the Code. There will be zero tolerance for any violations.

**Class Absences**

Students should contact the Course Manager, Mr. Dylan Hazelwood at dylan@umd.edu or 301-405-5434 to discuss make-up work or missed classes. **Proper documentation is expected.**
Late Assignments

Assignments are expected to be submitted by the due date listed on both Canvas and in the text of the assignment. Assignments submitted after the due date and time will incur a penalty of 5% of the total grade for the assignment per 24 hour period. If you have a medical emergency or other circumstances outside of your control and are unable to submit the assignment on time, contact the Course Manager at dylan@umd.edu.

Students with learning and/or other disabilities:

If you have a disability, please make an appointment with the Course Manager, Mr. Dylan Hazelwood at dylan@umd.edu or 301-405-5434 to discuss available accommodations to maximize your learning experience in this course. Learning disabilities must be documented by the Disability Support Services prior to receiving accommodations.

Note: We strongly encourage the students to come prepared to class by looking into the specific topical area for the week in order to actively participate in class discussions. It is recommended that the students read the biographies and visit the websites of the speakers in order to achieve a better understanding for their respective field of expertise.

Important dates and deadlines

Full schedule for all assignments will be given on Canvas. Dates may be subject to change, please verify on Canvas and with your instructor.
### Course Schedule (preliminary, subject to change):

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Topic</th>
<th>Wednesday</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>29 Aug</td>
<td>Introduction to the Course</td>
<td>31 Aug</td>
<td>Lecture: Future of Engineering</td>
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<tr>
<td>2</td>
<td>5-Sep</td>
<td><strong>No class - Labor Day</strong></td>
<td>7-Sep</td>
<td>Lecture: Social Change</td>
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<tr>
<td>3</td>
<td>12-Sep</td>
<td>Lecture: Electronics and Society</td>
<td>14-Sep</td>
<td>Lecture: Crowdsourcing</td>
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<td>19-Sep</td>
<td>Lecture: Autonomy</td>
<td>21-Sep</td>
<td>Lecture: Cryptocurrency</td>
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<td>26-Sep</td>
<td>Lecture: Climate Change</td>
<td>28-Sep</td>
<td>Lecture: Ethics</td>
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<td>3-Oct</td>
<td>Lecture: Design Thinking</td>
<td>5-Oct</td>
<td>Discussion for scholarly paper</td>
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<td>7</td>
<td>10-Oct</td>
<td>Philanthropy for Engineers</td>
<td>12-Oct</td>
<td>Motivations for Doing Good</td>
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<td>8</td>
<td>17-Oct</td>
<td>Grant Proposal Template and Questions for Nonprofits</td>
<td>19-Oct</td>
<td>Assessment Studies</td>
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<td>24-Oct</td>
<td>Team Nonprofit Selection</td>
<td>26-Oct</td>
<td>Class discuss nonprofits</td>
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<td>31-Oct</td>
<td>TBD</td>
<td>2-Nov</td>
<td>Students Meet With Nonprofits</td>
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<tr>
<td>11</td>
<td>7-Nov</td>
<td>Students Meet with Nonprofits</td>
<td>9-Nov</td>
<td>How to Make a Good Presentation</td>
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<tr>
<td>12</td>
<td>14-Nov</td>
<td>Special Lecture Topic</td>
<td>16-Nov</td>
<td>ESC Discussion</td>
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<td>13</td>
<td>21-Nov</td>
<td>Final Student Presentations Class 1</td>
<td>23-Nov</td>
<td><strong>No class - Thanksgiving</strong></td>
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<tr>
<td>14</td>
<td>28-Nov</td>
<td>Final Student Presentations Class 2</td>
<td>30-Nov</td>
<td>Decision to Final Two Nonprofits</td>
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<td>15</td>
<td>5-Dec</td>
<td>Final Two Nonprofit Presentations</td>
<td>7-Dec</td>
<td>Final Voting/Decision</td>
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<tr>
<td>16</td>
<td>12-Dec</td>
<td>Closing Discussion and Feedback</td>
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