ENGINEERING, DESIGN, & SOCIETY

WINTER 2025

ENGR 101

WWU

Credits: 3 | **Prerequisites:** none | **Textbook:** none

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Course Description

The work of engineers and designers is focused on creating a world that has never been. To build a better world, we must thoughtfully consider the impact of our designs on society. This course explores the complex linkage between social justice and the engineering profession with a focus on analyzing the impact of design, innovation, and product development on society. Together we will explore how social justice is relevant to the work of an engineer as we examine such things as the impact of bias on design, how our life experiences and social identities affect the work we do, the dynamics of professional ethics, and the need for diverse perspectives in technological innovation. The course also includes technical topics such as the design process, 3D visualization, and sketching to aid in the development of a socio-technical mindset.

Course Topics

This quarter we will be focusing on the major topics shown in Figure 1. Each topic area corresponds to one or more of the course learning outcomes. Students will develop the ability to consider ethical and societal factors in technological development while cultivating a mindset that values an inclusive and equitable approach to problem solving.

Figure 1: ENGR 101 Course Topics

WWU Syllabi Policy & Procedures

Refer to WWU Syllabi Policies at syllabi.wwu.edu for information and policy related to academic honesty, integrity, plagiarism, accommodations, equity, equal opportunity, civil rights, medical excuse policy, responsible computing agreement, and student code of conduct.
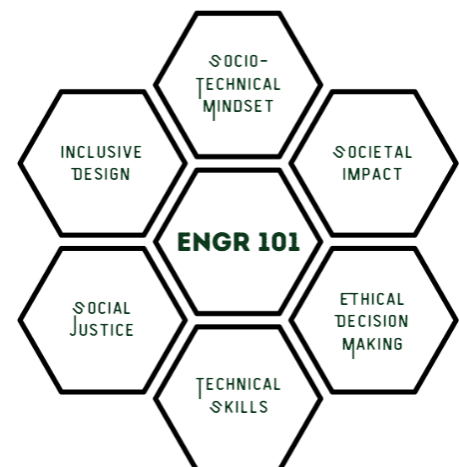
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Course Learning Outcomes (LO)

Learning outcomes form the foundation of the class and specify a skill, behavior, or action that a student can demonstrate if they have achieved mastery of the objective. To demonstrate mastery of the course learning outcomes, students will be assessed through the course assignments.

1. Demonstrate knowledge of the engineering and design professions and associated technologies
2. Conceptually explain the design process
3. Explain what constitutes social justice and the role it plays in engineering practice.
4. Identify how cultural concepts of race, gender, sexuality, and disability impact engineering practice.
5. Identify and analyze implicit bias in innovation and design.
6. Effectively communicate knowledge and understanding of professional ethics and social responsibility
7. Reflect on how your life experience, privilege, and culture affect the way you may practice engineering and/or design.
8. Visualize and create drawings to communicate engineering design ideas
9. Propose approaches to promote social justice in science and engineering practice.

The "Big Picture"

The learning outcomes and course topics are connected to series of 3 "big picture" questions. As we progress through the course, we'll delve into various facets of these questions, examining how engineering intersects with and influences the world around us. Rather than seeking definitive answers, our goal is to explore the multifaceted nature of these questions using critical thinking. We'll consider diverse perspectives, challenge assumptions, and develop a deeper appreciation for the intricate relationships between engineering solutions and their broader contexts.

ENGR 101 Big Picture Questions:

1. How do engineering disciplines and design practices shape our world, and how can they be leveraged to address complex societal challenges while promoting equity and inclusion?

2. In what ways do cultural, personal, and societal factors influence engineering decisions, processes, and outcomes, and how can we actively mitigate biases in these areas?

3. How can engineers balance technical, economic, social, and ethical considerations to create more accessible, inclusive, and socially responsible solutions?

GUR Designation

ENGR 101 aligns with the WWU Comparative, Gender, and Multicultural Studies (specifically, BCGM) GUR designation. The course seeks to inspire critical inquiry of the assumptions and practice of engineering and provides a framework in which students envision an alternative culture and practice of engineering rooted in social justice. ENGR 101 involves developing an understanding of the diversity of the human experience and its relationship to our place in the world and value systems as it relates to design and innovation.

Core Literacies

Core Knowledge Literacy: This course aligns with the Civic, Ethical, and Environmental literacy. ENGR 101 provides a framework for students to learn about human experiences and identities, social/cultural values systems, engineering as an organization, and the relationship between those elements.

Core Practice Literacy: ENGR 101 satisfies the Communicative & Interpretive Literacies (reading, interpreting, and communicating information through oral, print, & digital media and genres for audiences, both specialized and general) and the Critical & Reflective Literacies (evaluating and contextualizing sources and information, applying various theoretical frameworks to examine and/or evaluate texts, knowledge, and truth claims, and identifying and examining one's own (and other's) assumptions, values, and beliefs).

COURSE DETAILS

Canvas

All course materials will be available on Canvas, the WWU learning management system. This includes announcements, reminders, readings, assignments, and class session agendas. All assignments will be assigned, submitted, and reviewed using this platform.

You are expected to check Canvas regularly (daily is best) for important course announcements, reminders, assignments, and grades. You can set up course notifications to send an email if there is an announcement, new assignment, or other class update.

- Log on to https://wwu.instructure.com and find our class (you are automatically enrolled in the ENGR 101 canvas class so you should see it on the dashboard).
- Ensure you are getting instructor notifications and announcements by checking your notification preferences in Canvas.
- Contact WWU Academic Technology and User Services (ATUS) for general help with Canvas
- You can also ask the professor or the TA for help with canvas, especially when it questions relate to particular course assignments.

Time Management

Time management is often a challenge for students. Take some time at the beginning of the quarter to create a schedule and structure that will allow you to complete the course material while balancing your other academic, personal, and professional commitments. I suggest adding weekly due dates for the quarter to your calendar at the start of the quarter.

Office Hours

Office hours are listed on page 1. You can find me in my office (Ross Engineering Technology Room 272) during office hours. If the office hours don't work for you, send me an email and we can arrange an

alternate time. I can almost always meet via MS Team or Zoom instead of my office if you prefer. You can also meet with the teaching assistant (TA) during their scheduled office hours. Teaching assistants are a great resource for students!

Community Ambassador Office Hours: Need more support? The Community Ambassador (CA) program consists of faculty from each department in the College of Science & Engineering who are dedicated to creating a more equitable and inclusive community in STEM. You can find a list of all Community Ambassadors on the [CSE inclusion page](). Community Ambassadors meet with students to listen to concerns, guide people to resources, and/or brainstorm with faculty, staff, and students in the College of Science & Engineering.

Course Requirements

Engagement (40%)

Student engagement is essential for learning in this class. Class sessions will require active and constructive participation of all students.

Engagement is graded on the following:

1. **Weekly reading quiz** (points vary; typically 4-5 points) – always due before class on Tuesday

Each week I will assign readings and media to be completed before our first weekly class session. After reviewing the readings, you will complete a short reading quiz. The purpose of the weekly readings and associated quiz is to prepare you for the class session which will be focused on active learning rather than lectures. Reading quizzes are due on Tuesday before class.

Late policy for reading quiz: Late quizzes will be accepted with a 10% deduction per day. Quizzes submitted more than 10 days late will receive zero credit.

2. **Class attendance & participation** (2 points per class)

Most of our class time will be spent working on in-class activities designed to actively engage you in learning. Your participation in class is essential to your learning. These activities come in different formats such as worksheets, discussions, and short projects.

Note on participation: I acknowledge that not all students participate in the same way. My expectation is that you come to class prepared and you engage in a way that is comfortable to you. Class engagement can be expressed in a variety of ways including, but not limited to, participation in class/team discussion, attentiveness, attendance, timeliness, preparedness, respect for others, reflection, and the ability to create space for others.

Missed class policy: You cannot receive credit for participation if you are not in class. If you have extenuating circumstances and/or need to miss class for a prolonged period, please contact the instructor and alternate arrangements can be made.

Engagement Extra Credit - Students will be provided with opportunities to earn extra credit by attending department events outside of class time. This is a good way to make up points if you need to miss class. More details will be provided in class and on canvas.

There will be 3 quarter-long projects, each worth 20% of your grade. Each project will have multiple assignments that will be due at different times throughout the quarter. You will be working on all three projects simultaneously so time management will be important.

1. **Discipline Deep Dive:** You will choose a major/program/career that you are interested in learning more about and will investigate relevant aspects of the discipline. Assignments will include an interest/goals worksheet, group exploration process and presentation, academic plan, and written summary of the project experience.

2. **Engineering for Equity:** This project is designed to deepen your understanding of the relationships between engineering, ethics, and social justice. Assignments will include surveys, case study analysis, and personal reflections.

3. **Make-Do-Build:** You'll learn to use some of the equipment in the makerspace and will build technical skills by completing a hands-on project. Requirements include creating a CAD model and either 3D printing or laser cutting an object based on that model. If you have previous experience with 3D printing and laser cutting in the WWU makerspace, you can talk to the instructor about alternate project opportunities. Assignments will include earning a makerspace badge, creating CAD model, creating a prototype, an informal presentation, and a report.

Late policy: Late assignments will be accepted with a 10% deduction per day. Assignments submitted more than 10 days late will receive zero credit. There are a few exceptions to this policy which will be clearly stated in project assignment (ex: the Make-Do-Build project presentation cannot be submitted late).

Content Organization

1. **Weekly content is made available on Sunday:** The course will be organized into weeks with the start of the week being **Sunday**. Each week will focus on a different topic as detailed in the *Tentative Course Schedule*.

2. **Complete the weekly reading and quiz by class time on Tuesday:** Each week the instructor will post a list of resources that will aid students in preparing for class and completing homework. Content will include readings, podcasts, videos, surveys, and/or short activities. Readings, and the associated reading quiz, need to be completed before the Tuesday class session.

3. **Attend class Tuesday & Thursday:** Students are required to attend class and will be graded on attendance and engagement in class. Expect to participate in discussion and activities related to the assigned readings and weekly assignments.

4. **Submit Assignments:** The majority of the assignments will be due *Sunday at midnight*. Students can turn in assignments earlier if they choose.

Grading

Course grades are based on the following:

Engagement *(quizzes & attendance)*	40%
Discipline Deep Dive Project	20%
Engineering for Equity Project	20%
Make-Do-Build Project	20%
TOTAL	**100%**

Letter grades will be assigned as follows:

93-100	**A**	80-82	**B-**	67-69	**D+**
90-92	**A-**	77-79	**C+**	63-66	**D**
87-89	**B+**	73-76	**C**	60-62	**D-**
83-86	**B**	70-72	**C-**	0-59	**F**

Late work point deduction: Canvas will automatically deduct points for late work. Submission time is based on when the assignment is submitted to Canvas. The days late will be rounded up to the next whole number. For example, if you submit an assignment 1.3 days late, canvas will treat it as 2 days late and will deduct 20%.

Assignment submission accuracy: It is your responsibility to ensure that assignments are properly uploaded to canvas. Be sure to check your submissions for accuracy – we recommend you confirm your submission was successful by viewing it. Assignments that are not submitted properly (e.g.: blank word documents, previously submitted assignments, incorrect formatting) will receive zero credit.

Tentative Course Schedule

Week	Topic Areas	
Week 1	**Introduction** *Getting acquainted with the course and the department*	General course information & building tour Belonging & academic success Class norms
Week 2	**Engineering & Design as a Profession** *Understanding the field and the engineer's role in society*	Who gets to be an engineer? What is Engineering? What is Design? "Tools of the trade" – skills & competencies ENGD @ WWU – majors & admission
Week 3	**Equity, Justice, and Engineering Practice** *Designing a more equitable world*	What is the role of engineering in society? How do our individual backgrounds and experiences shape our approach to engineering and design? How do our cultural ideas about race, gender, ability influence engineering knowledge?
Week 4	**Developing Sociotechnical Mindsets** *Bridging technology and society for holistic solutions*	How do engineering decisions shape the distribution of benefits and harms across different communities? What is implicit bias and how might it impact innovation?
Week 5	**Inclusive Design** *Expanding the boundaries of innovation*	What is the design process and how do we use it? What are the key elements of inclusive design? How can we ensure that engineering solutions meet the diverse needs of all users, including marginalized groups?
Week 6	**Professional Ethics** *Navigating ethical dilemmas in engineering and design*	Integrity, morals, and ethics: what's the difference? What ethical responsibilities do engineers have to ensure their designs promote equity and justice? How do engineers address potential ethical dilemmas?
Week 7	**Learning Lab** *Using the makerspace to develop technical skills*	Developing your technical skills using the tools in the makerspace. Student Choice: 3D Printing or Laser Cutting
Week 8	**Communicating Design Ideas** *Using engineering tools to communicate technical information*	How do engineers communicate their design ideas to diverse user groups? Spatial visualization skill development Introduction to Computer Aided Design (CAD)
Week 9	**Changing the Landscape** *Confronting racism and cultivating allyship*	Discrimination in ENGR profession: Why are women and people of color still so underrepresented in engineering? How can engineers act as allies and agents of change in addressing systemic oppression?
Week 10	**The Future of Engineering** *Visioning tomorrow: crafting a just and innovative future*	What systemic changes are needed in engineering education and practice to promote social justice? How do we improve diversity in engineering?

There is no final exam for this course and all assignments will be due at the end of the last week of the quarter (i.e.: no assignments will be due during final exam week)