MECHANICAL ENGINNERING TECHNOLOGY

STUDENT HANDBOOK

Engineering Technologies, Safety, and Construction Department

Central Washington University

Rev. 202009

I. Introduction

Welcome to the Engineering Technologies, Safety, and Construction (ETSC) Department and to the Mechanical Engineering Technology (MET) program. This guide was prepared as a supplement to information found in the Undergraduate/Graduate Catalog and is intended to assist students in planning and completing a Bachelor of Science Degree in Mechanical Engineering Technology.

The information contained in this guide is not a substitute for the Catalog or Class Schedule. It should be noted that it is the student's responsibility to become familiar with important dates, deadlines, regulations, and rules contained in the Catalog and Class Schedule. The Central Washington University (CWU) Catalog can be found online at the Registrar's website – Catalogs & Handbooks. If you have any academic questions, feel to contact MET Faculty, Professional Advisor (509-963-3423), or Registrar (509-963-3001).

II. Program

The four-year Bachelor of Science Degree in Mechanical Engineering Technology is one of several degrees offered through the ETSC Department, which is in turn part of the College of Education and Professional Studies. The program is housed in the Hogue Technology Building, and most of the MET courses meet in Hogue.

The program has smaller class size allowing for individual attention and a broad range of exposure to all aspects of mechanical engineering technology. Most core courses have a laboratory component as a co-requisite.

The MET program encompasses a broad foundation in the practical application of mechanical and manufacturing engineering principles. Graduates may pursue career paths such as: machine and product design, product and system (test) evaluation, plant operation and management, technical sales, field service, environmental quality control, energy production, and manufacturing process analysts, quality assurance, and technical field representatives. A list of companies that employ alumni can be found on the MET website under industry support.

III. Admission to the program

Admission to the university does not assure admission to the MET program. To be eligible for admission to the program students:

- Must be in academic good standing as defined in the CWU Scholastic Standards.
- Must complete an academic plan to graduation with a professional advisor affiliated with the MET program. They can be contacted at (509) 963-3423 or at the advising web site.
- Must complete and submit a major declaration form. This can be requested from the Professional Advisor.

Students are encouraged to meet with their advisor as soon as they are interested in the MET program, in order to facilitate effective advising.

IV. Advising

Students are responsible for meeting with their advisor to develop an academic plan that will meet the requirements of the University and of this major. Prior to registration for each quarter, students should communicate with the professional advisor affiliated with the MET program (Engineering Technologies). Occasionally courses and curriculum change and many courses are only offered in certain quarters. If you miss one, you will be out of sequence and must wait until the following year. It is the responsibility of the student, rather than the advisor, to continuously audit his/her program for successful completion of the requirements. It should be noted that students must obtain permission numbers from their faculty advisor in order to register for some MET courses.

V. Curriculum

In addition to the University General Education requirements students must complete the MET program course work found in the Undergraduate Catalog. It should be noted that many courses have prerequisites. It is imperative that students meet with an advisor each quarter, prior to registration to update their academic plan to graduation.

In the absence of an appropriate background, the program may require additional time to complete.

Note that you (the student) are responsible for making an academic plan and registering for courses.

Further, those students interested in taking engineering courses after graduation should complete the calculus-based physics series.

MET curriculum should always be referenced from the Undergraduate Catalog, but a copy can also be found on the MET web site under curriculum.

VI. General Education Requirements

In order to assist you in meeting the requirements for Central Washington University, outside of the Mechanical Engineering Technology major, a description of graduation and general education requirements is found in the CWU Undergraduate Catalog. Feel free to discuss this, and any further questions with the professional advisor affiliated with the MET program (Engineering Technologies).

VII. Academic Performance

Academic performance for MET majors is governed by the standards set forth in the University Catalog. You should become familiar with University's information pertaining to study load, withdrawal from a course, grade point average, repetition of courses, incomplete grades and scholastic standards. It should be noted that all required courses in the MET major must be taken for a letter grade.

Be aware there are several courses that require minimum grades to continue to progress in the program

- MATH 173 Calculus II (C or better)
- PHYS 181/181LAB General Physics II (C+ or better)
- PHYS 112/112LAB Introductory Physics II (C+ or better)
- ETSC 311 Statics (C+ or better)
- ETSC 312 Mechanics of Materials (C+ or better)

VIII. Accessibility and Accommodations

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning, discuss your concerns with the instructor. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations. Student Disability Services is in Hogue 126. Call (509) 963-2214 or email Disability Services, ds@cwu.edu, for more information.

IX. Diversity

CWU expects every member of the university community to contribute to an inclusive and respectful culture for all in its classrooms, work environments, and at campus events. More information can be found at the CWU Mission, Vision, and Diversity Statement web page.

X. Cultural Observance

In compliance with RCW 28B.137.010, Central Washington University makes every effort to deal reasonably and fairly with students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Students must present written notice to their instructor within the first two weeks of class listing the specific dates on which accommodations are required. Contact the Dean of Student Success at (509) 963-1515 for further information or questions."

XI. Ethics

Plagiarism will not be tolerated:

Plagiarism which shall mean the appropriation of any other person's work and the unacknowledged incorporation of that work in one's own work offered for credit. Anyone not familiar with how to paraphrase, quote, or cite is encouraged to seek assistance from the Writing Lab on campus. Any assignment evident of plagiarism will result in a failing grade of zero value. CWU Student Conduct Code is enforced.

Violations will not be tolerated:

Ethics violations shall mean violating the rules of conduct appropriate to an engineer and, but not limited to, falsifying data, intellectual piracy, inappropriate time documentation. Evident of such behavior will result in a failing grade of zero value. CWU Student Conduct Code is enforced.

Cheating on exams will be dealt with in the same manner as cheating on an FE test – the score will be a "0". CWU Student Conduct Code is enforced.

XII. Student Organizations

Students are strongly encouraged to become involved with at least one of the student chapters represented by the MET program:

- The American Society of Mechanical Engineers (ASME), advised by Dr. Choi.
- The Society of Manufacturing Engineers (SME), advised by Professor Pringle.
- The Society of Women Engineers (SWE), (no advisor currently)
- The Foundry Educational Foundation (FEF), (no advisor currently)

The student chapter of ASME is sponsored by the local chapter in the Tri-Cities. The chapter provides professional development through design activities, guest speakers, field trips, community projects and participation in regional conferences. It only costs about $20 per year, and the student receives 12 months of the ASME magazine (Mechanical Engineering), as well as many other benefits. Scholarships are also available to members of ASME (www.asme.org).

SME was started in 2003 and is a strong advocate of manufacturing and supported by SME Chapter 39 in Seattle. The possibilities for scholarships and networking through SME is quite favorable. More information can be found at SME (www.sme.org).

SWE is a diversity-oriented organization that promotes women in the engineering field. Networking and support are important aspects of the group. Check it out at www.swe.org.

FEF is an organization that specifically supports the foundry industry. Annual scholarships to at least two students are given out each year at Central. Also, two students are flown to Chicago for an annual College Industry Conference that offers an excellent networking environment. More information can be found at www.fefoffice.org.

XIII. Summer Employment

Although not specifically required by the major, students are strongly encouraged to gain practical engineering experience over the summer months. Not only will this complement their classroom education it will also help to bolster their resume when seeking permanent employment upon graduation. Employment opportunities, both for summer and permanent positions, may be announced in class, but are often posted to the MET Facebook page. Students are also encouraged to establish a placement file with Career Services.

XIV. Use of Facilities

The Hogue Technology Building is open Monday through Friday and students are encouraged to fully utilize the facilities that it has to offer. Lockers are available on the first and second floor for student use free of charge. Choose a locker and report the locker number to the Department secretary (Hogue 101). Students are responsible for providing their own locks and making sure that their locker is clean, and their lock removed when vacating the locker. The student lounge, which includes a microwave oven, is available as a student study and break area. Please keep it clean.

Computer labs are in rooms 118 and 120 for your use when not being used for course instruction. Open hours will be posted outside the door. The other labs (Machine, Wood, Materials, Foundry, Thermo/Fluids, and Senior Project) are available for student use once the appropriate safety training is completed and ETSC safety rules are adhered to.

XV. Scholarships

Numerous scholarships are available each year for students majoring in MET. The American Society for Mechanical Engineers, the Society for Manufacturing Engineers, The Society for Women Engineers, and the Foundry Educational Foundation all offer annual scholarships. Applications will be made available through faculty members in the program and deadlines for application will be announced in class. All students are encouraged to apply for any scholarship for which they may be eligible.

XVI. Program and Student Assessment

A comprehensive assessment program has been developed to measure how well the Mechanical Engineering Program is meeting its mission and how well the students in the program are meeting the stated intended student outcomes of the program.

A. Mission

The mission of the Mechanical Engineering Technology Program is to provide a Bachelor of Science degree to students seeking an education leading to a career as an engineering technologist in the mechanical or manufacturing fields. The MET program is responsive to the State of Washington and its industry by providing a curriculum and training of students that is in harmony with our extended community.

The secondary mission is to maintain a healthy relationship of education excellence, faculty research, student involvement, and corresponding contact with the mechanical engineering technology industry to provide mutual support for our academic, industry, and extended community.

1. MET Program Educational Objectives

(Ratified 2017-May IAB)

1. MET graduates will perform effectively within their chosen work environments and will enhance their professional skills through continuing professional development.

2. MET alumni will demonstrate responsible citizenship by participating in professional organizations and community engagement.

2. Student Outcomes (ABET Criterion 3)

(1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

(2) an ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;

(3) an ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;

(4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

(5) an ability to function effectively as a member as well as a leader on technical teams.

3. Program Outcomes (ABET Program Criteria)

a. Application of principles of geometric dimensioning and tolerancing;

b. Use of computer aided drafting and design software;

c. Perform selection, set-up, and calibration of measurement tools/instrumentation;

d. Elements of differential and integral calculus;

e. Manufacturing processes;

f. Material science and selection;

g. Solid mechanics (such as statics, dynamics, strength of materials, etc.);

h. Mechanical system design;

i. Thermal sciences (such as thermodynamics, fluid mechanics, heat transfer, etc.);

j. Electrical circuits (ac and dc) and electronic controls;

k. Application of industry codes, specifications and standards; and

l. Technical communications typically used in preparation of engineering proposals, reports, and specifications.

XVII. Report Writing

The main reason for writing a report is to communicate results. Reports should be written in third person, past tense (or third person, dead). This means do not use first person (personal pronouns) when writing a report. A pronoun is a word that substitutes a noun, such as *it* (substituting for the name of a certain object) or a person, such as *she* (substituting for the name of a person). While writing, a pronoun must always be clearly and previously identified before it is used.

Pronouns are of three persons:

1) **First person**, representing the person speaking.
2) **Second person**, representing a person or thing spoken to.
3) **Their person**, standing for a person or thing spoken of.

Table 1. Pronoun cases

CASE:	Subjective		Objective		Possessive	
	Singular	Plural	Singular	Plural	Singular	Plural
First Person	I	we	me	us	my mine	our ours
Second Person	you	you	you	you	your your	your yours
Third Person	he she it	they	him her it	them	his, her hers its	their theirs

XVIII. Types of Reports

These instructions are intended to guide you in creating documents for MET program labs at CWU. Refer to lab report formatting example in a subsequent section.

Remember the reason for this effort: To communicate your message effectively. The message in a lab report should include: the purpose (or objective) for conducting the lab, a description of how the

experiment was conducted and what was observed, an analysis of the results with relevant comparisons, a conclusion, and references. It is about the lab, not what you did. No first-person pronouns!

A. Report Format

In all technical written communication, a basic format is chosen. For each lab, a set of "instructions to the author" will be selected to which you should refer (see the attached examples of a current journal 'instructions' and a paper). There are three types of reports that you may be asked to provide from a lab activity: a lab report, an executive memo, and executive summary. Each address different needs and has different intended audience & formatting requirements. Information about content and formatting for the three report types follows, along with examples of each.

1. Lab Report Format

Lab Reports are intended to describe how an experimental procedure was performed, what was observed, and what the results mean. The lab report should have enough information to allow someone to reproduce the experiment and get the same results.

Page Formatting

- Title page has only the information listed, and all title page lines should be center justified with Title 36 pt. size lettering; all other lines 24 pt.
- Remainder of report starts on page 2, with section headings and use Times New Roman font, 12 point, 1-1/2 or double spacing, left justified.
- Appendix should start on a new page.

A lab report should include a separate title page along with the following sections: Introduction, Procedure, Results, Discussion, Conclusion, and References.

a) Title Page

Include Title of Experiment, Name (& Lab Partners if any), Class, Date

This information should be its own page, page 1

b) Introduction

This section introduces the reader to the subject at hand. It explains the significance of the work and details an objective. Appropriate limitations and constraints are mentioned, revealing the scope of the study. After reading the introduction, a reader should have a grasp of the scope of this work, and what is included in the following pages.

c) Procedure

The procedure section details the experimental method employed. If a standard procedure was followed (ASTM ###-97), then include the reference. The objective of this section is to enable the reader to duplicate the results (remember 'cold fusion'?).

d) Raw Data

The results section includes the presentation of observations and data collected. Any raw data can be attached in an appendix, while tabulated data can be included in the body of the text. Avoid presenting

data without any supporting text or comments. Comment on the accuracy, resolution, precision, and trends in the data. Comparison of your data with previously published results is appropriate.

e) Discussion of Results

The discussion section is where the results are analyzed to gain insight and accomplish the objective of the paper! Data may be presented in a different format (such as stress/strain vs. load/deflection plots) in order to correlate the data to a prevailing theory. Note that these prevailing theories need not be explained in detail but can be referenced to (by referencing an appropriate source). The discussion should concentrate on using the experimental data, considering current knowledge, to achieve the objective of the study.

f) Conclusion

The conclusion section should summarize both the essential observations and results of the study, as well as any significant findings that were supported by the data. Many conclusion sections are formatted by numbers (bulleted items) or by paragraphs for each point. Do not include any new data or discussion! Everything stated in the conclusion section should have been previously mentioned.

g) References

The reference section should include the published sources that you relied on for the technical information in your report (usually your textbook, but sometimes including other sources). The reference section is required, both as a tool to cut down on the verbiage, and to recognize the efforts of your colleagues! This is both ethical and efficient. The reference section also allows the distinction between work that is original and work that has been previously accomplished. Use the format shown in the notes to authors.

h) Appendix

The appendix starts on a new page, and includes the raw lab data sheet, sets of calculations you may have done by hand or in a spreadsheet, and any other supporting documentation that might be helpful in interpreting the lab (i.e., equipment spec sheet)

2. Memo

The purpose of a memo is to produce a one page, very concise answer to a question, written so that the intended recipient can quickly understand the information without having to analyze it further. This requires collecting the desired information, and then distilling it down into a one-page report. Often the supporting data will need to be attached as an appendix so that the information is readily available if there are questions as to the source of data or a need for further information. The technical memo should be expressing the facts as you find them, not expressing your opinion about the facts. Refer to memo formatting example in a subsequent section. No first-person pronouns.

Page Formatting

- No title pages. It consists of only one page followed by supporting documents.
- The page should include date (Date:), sender's name (From:), recipient's name (To:), and subject line (Subject:), followed by the text of the memo. There should be double spaces between date, names, subject, and body of the memo.
- All should be in Times New Roman font, 12 point, single spacing, left justified.

A memo should include the following sections: Introduction, Discussion, Conclusion, and Attachments.

a) Introduction

The introduction should contain the purpose, context, problem, and the specific assignment or task. Give the reader a brief overview of what the memo is about before indulging the reader with details and the context.

b) Discussion

The discussion contains details that support the solution. Begin with the information that is most important. Start with your key findings or recommendations or with your most general information and move to your specific or supporting facts. (Same applies to details: strongest to weakest.) The discussion segments include the supporting ideas, facts, and research that back up your argument in the memo to persuade the reader to follow your recommended actions.

c) Conclusion

The conclusion contains summation of information and recommendations.

d) Attachments

The attachments support your findings and provide more detailed information when necessary. Be sure to refer to your attachments in your memo

The memo itself should be limited to one page and may include a chart or table as a referenced attachment, if that helps make the data easier to understand. Supporting data may be included as additional attachments.

3. Executive Summary

An executive summary is a short document or section of a larger report or proposal. It's used to give a reader a quick overview of the larger body of material. In other words, it summarizes a report so that executives don't have to read the whole report to understand its purpose.

It contains a short statement that addresses the problem or proposal detailed in the attached documents, and features background information, a concise analysis and a conclusion. An executive summary is designed to help executives decide whether to go forth with the proposal or not, making it critically important.

The executive summary should not stray from the material that follows it. It's a summary, not a place to bring up new ideas. To do so would be confusing and would jeopardize your whole proposal. Refer to memo formatting example in a subsequent section. No first-person pronouns!

XIX. Lab Report Rubric

The lab grading guideline is to provide technical and writing criteria as well as a common basis or format for evaluating lab reports in the MET program.

A. Lab Report

The criteria for evaluation are divided into four parts - Format, Grammar, Technical Content and Effectiveness.

1. Format

This term refers to the appropriate use of sections (title, introduction, results, discussion, conclusion, references). Also included are any conditions or requirements on figures, tables, graphs, or even page limits.

2. Grammar

Typical examples in this area include spelling, sentence structure, tense, plural, capitals and misplaced modifiers. No first-person pronouns!

3. Technical Content

The body of the work is formed around the results gathered. Also, any generated data or graphs are explained. Interpretation of data and any discussion of the work are detailed here. Finally, any conclusions are evaluated.

4. Effectiveness

This term refers to aspects of the report which make it an effective communication tool. This includes the order in which material is presented (chronological vs. material type, etc.), supporting graphics (arrows in pictures, etc.), and appropriate selection and use of adjectives. It also includes the referencing done (to the literature) and can reflect the depth of effort put into the report.

- Format 20/20
- Grammar 15/20
- Tech. Content 35/40
- Effectiveness 10/20

80/100 = “B” Grade

B. Memo

Refer to Lab Report rubric.

C. Executive Summary

Refer to Lab Report rubric.

XX. Report Type Format Example

A. Lab Report

1. Lab Report Title Page

Lab 1: Name of Lab

By Your Name Here

Lab Partners:

Larry

Moe

Curly

MET XXX

Date:

2. Lab Report Body

Introduction

Procedure

Raw Data

Discussion of Results

Conclusion

References

Appendix

B. Memo

From:

To:

Date:

Subject:

Begin single space memo here.

C. Executive Summary

Problem

Solution

Success Criteria

XXI. Green Sheet Format

Name: Class: Date: Page #/#

GIVEN:
State all relevant information to solve the problem such as: loads, constraints, geometry, and other meta data.

PICTURE OF PROBLEM:
Should include loads, constraints, Image of actual device/item.

FIND:
State the engineering value of interest(s). Include any other engineering aspect required to determine value of interest.

ASSUME:
Assumptions to consider…
Effects of gravity, friction, load application, boundary constraints, in homogenous or anisotropic material properties, failure modes, measurement device precision, material surface tolerance.

FREE BODY DIAGRAM:
Schematic of whole device or appropriate portion of device at point of interest for load

METHOD STATEMENT:

1)
2)
3)

Please outline your method for solving this problem in a stepwise manner.

SOLUTION:
This is where all the calculations are placed in the sequence of your method.

ANSWER:
Please box answer and include units or other appropriate statements.

TOLERANCE:
This value should reflect any relevant assumptions