

**Introduction to Engineering and Technology**  
**CCRI ENGR-1020**  
**Spring 2018**

**Instructor** Jerry Bernardini

**Telephone** 401-825-1189 Office

**E-mail** [jbernardini@ccri.edu](mailto:jbernardini@ccri.edu)

All E-mail must be sent with the subject: ENGR-1020-001  
ENGR-1020-xxx xxx = course section number

**Office** Room 2188:

**Hours** Tuesday 1-2PM, 5-6PM, Thursday 4-6PM (E-mail me a day in advance)

**Course**

**Materials**

1. Textbook: "Thinking Like An Engineer", 4<sup>th</sup> Edition, ISBN-13 978-0-13-463967-3
2. Course Website: [https://www.ccri.edu/faculty\\_staff/engt/jbernardini/ENGR-1020](https://www.ccri.edu/faculty_staff/engt/jbernardini/ENGR-1020)
3. Website assignments
4. Weekly Handouts
5. Online videos
6. 1 GB or larger USB Flash memory: Student must purchase a USB Flash memory device (Jump-Drive) and bring it to all classes.
7. Students must purchase a bound notebooks to used as an Engineering Journal
8. Microsoft Office: The student must have access to Microsoft Word, Excel and Power Point outside of class. Office-360 and Google-Docs will not be used in class or accepted for assignments.

**Grading**

**Policies**

Quizzes (2).....	20%
Progress Reports.....	15%
Final Exam.....	15%
Journal Evaluations (2)....	15%
Homework.....	15%
Team Project .....	20%

. 100%

**Course Objectives:**

1. Learn about the major activates of engineers and technicians.
2. Learn the application of engineering principles to a wind turbine design.
3. Use Problem Based Learning (PBL) to develop engineering and critical thinking skills.
4. Learn project management and effective technical team activity skills.
5. Learn to use Microsoft Excel for technical applications.
6. Learn to use Microsoft Word for reports and resumes.
7. Learn to use Microsoft PowerPoint for technical presentations.
8. Learn the benefits of ethical behavior and practices in engineering and business.
9. Learn the engineering design process.
10. Learn how to setup and keep engineering journal.

## **Course Methodology**

1. Project Based Learning applied to course material
2. Bi-weekly one-page progress reports
3. Website for all course material
4. Limited classroom lectures
5. Homework research assignments
6. Classroom discussion of research assignments
7. Readings assignments
8. Hands-on lab projects
9. Classroom project team/instructor meetings
10. Classroom computer applications
11. Computer application instruction and assignments
12. Project Team meetings and activities
13. Project Team construction
14. Project Team testing and analysis
15. Project Team report and presentation

## **Course Policies**

1. The class will be a cell phone free environment. Phones must be on vibrate and if you must take a call, it must take outside the classroom.
2. To receive full credit for class participation, students must attend all classes. If a student misses a class it will be the student's responsibility to obtain the assignment from the website.
3. Unless specified, all homework assignments are due one week after assigned.
4. Homework will be accepted up to one week after the due date with a maximum of 50% of the normal grade. No assignments will be accepted after a one week.
5. Unless specified all parts of the homework assignments (HW) must be submitted printed and stapled as one package. Often there are multiple parts to a homework assignment.
6. All assignments must be completed in Microsoft Word or Microsoft Excel and submitted in printed form.
7. Students are expected to be prepared to discuss in class an assigned research topic.
8. The project must be completed as a team. Although the project grade is a team grade, members of the team that do not contribute will receive a reduced project grade.
9. If a project team is not functioning it is the responsibility of the team members to resolve the issues. This is an important skill for the work place. If a resolution of team problems this is not possible, the instructor must be informed of the problems before class-7.
10. Students must bring their engineering journal to every class with up to date entries.
11. Students must save their classroom and homework on a USB drive.

# Introduction to Engineering and Technology

## CCRI ENGR-1020 Spring 2018 Outline

Class	Class Activities and Objectives	Textbook and Readings	Homework and Team Assignments, Quizzes, Evaluations
1 (1/22)	Introductions Build a team Problem Based Learning (PBL) Engineering design process Project Overview Engineering Journal-EJ (HO1) Tools and equipment Excel-Introduction (TE1) <b>Lab- Tour and demo</b>	Chap-1, p.8-39 Chap-3, 73-79 Chap-10, 297-301 Handout-HO1 Excel-PDF Excel-TE1	p.42, prob. 13 (type the answers)
2 (1/29)	Team Agreement One-Page Memo Progress report(TW1) Engineering failures and technology ethics PowerPoint and Assignment (RP1) Generator equation Discuss energy and power Discuss wind technology Measurements and data averaging Excel - magnet data Using a Gaussmeter <b>Lab- magnets measurements (HO2)</b>	Chap-2, p.43-53 Chap-4, 104-105 Word-TW1 Handout-HO2 Rubric-RP1	p.58, prob. 1-7 ; type the question and your answer Complete Progress Report Memo-1 Start PowerPoint Assignment (due in three weeks)
3 (2/5)	Design Process Discus Faradays law Generator electrical model Using electrical instruments Excel-Coil wire estimates(TE2) Intro. Unit conversion-1 Troubleshooting Using a digital Voltmeter (DVM) <b>Lab- Coil winding and testing (HO3)</b>	Chap-3, p. 61-72 Excel-TE2 Handout-HO3	p.86, prob. 1-10
4 (2/12)	Turbine prototype frame construction Generator modeling Introduction to Ohm's law Unit Conversion-1 Drilling charts <b>Lab-Generator construction (HO4)</b>	Chap-4, p.91-110 Handout-HO4	p.118, prob. 1-7 Complete Progress Report Memo-2
5 (2/19)	Project sketching Turbine (HO5) Energy and Power Scientific and Engineering notation Measure voltage and frequency Measure rotational velocity Excel-Generator Data and Graphing (TE3) <b>Lab-Generator Testing (HO6)</b>	Chap-5, p. 124-141 Excel-TE3 Handout-HO5 Handout-HO6	p. 144, prob. 1, 6 <b>Quiz-01</b> <b>Journal Evaluation-01</b>
6 (2/26)	PowerPoint presentation Group-1 Team an Instructor meetings Turbine wind blade discussion	Chap-6, p. 146-158 Handout-HO7	p. 161, ICA 6-7 <b>PowerPoint Presentation-01</b> Complete Progress Report Memo-3

	Lift vs. drag blades Dimensional analysis <b>Lab-Prototype turbine construction-1 (HO7)</b>		
7 (3/5)	PowerPoint presentation Group-2 Turbine wind tunnel testing Wind tunnel data analysis Excel-Wind Tunnel Testing (TE4) <b>Lab-Prototype turbine construction-2</b>	Chap-7, 168-188 Handout-HO8 Excel-TE4	p. 196, prob. 1, 5 p. 197, prob. 14 p. 201, prob. 47 <b><u>PowerPoint Presentation-02</u></b>
(3/12)	<b>Spring Break-No Class</b>		
8 (3/19)	Betz's Law Discussion (HO9) Wind turbine power calculations and measurements Wind turbine improvements Wind Turbine Project Rubric-(RP2) <b>Lab-Prototype wind tunnel testing (HO8)</b>	Chap-8, p. 202-216 p. 231-244 Handout-HO9 Rubric-RP2	p. 267, prob. 66, 67, 68, 69 Complete Progress Report Memo-4
9 (3/26)	Turbine testing and modification Turbine performance metrics Measure mechanical vs Electrical power Probability calculations Statistical calculations Excel- Wind Turbine Performance (TE5) <b>Lab-Improved wind turbine design</b>	Chap-9 p. 269-278 Excel-TE5	Wind power problem set
10 (4/2)	Turbine testing and modification Binary Numbers Application of binary Digital vs. Analog Internet and Internet of Things (IoT) Excel-Turbine Power Curves (TE6) <b>Lab- Wind Turbine Modification and Testing</b>	Chap-10 p.297-333 ADC-DAC handout Excel-TE6	Wind Tunnel Excel Calculations Complete Progress Report Memo-5 See Website <b><u>Quiz-02</u></b>
11 (4/9)	Flow Charting Project Flow Charting with Visio (TV1) Gas Station pumping problem <b>Lab- Wind Turbine Modification and Testing</b>	Chap-11 p. 361-388 Visio-TV1	Wind Turbine performance graphing Complete Gas Station Flow Chart
12 (4/16)	Flow Charting- Gas Station Solution 3D printing <b>Lab- Wind Turbine Modification and Testing</b>	Chap-12 p. 412-430	Wind turbine analysis Complete Progress Report Memo-6
13 (4/23)	Turbine overall analysis Project report activates <b>Lab- Wind Turbine Modification and Testing</b>	Chap-13 p. 465-471	
14 (4/30)	<b>Project Rubric Evaluation (RP2)</b> <b>Team Project Presentation</b>		<b><u>Journal Evaluation-02</u></b>
15 (5/7)	<b>Final Exam</b>		