Note:

Course content may be changed, term to term, without notice. The information below is provided as a guide for course selection and is not binding in any form, and should not be used to purchase course materials.
COURSE SYLLABUS

STEM 201
INDUSTRIAL ENERGY II

COURSE DESCRIPTION
This course focuses on electric energy technology in power-plant operations. Topics include combined cycle fundamentals, heat recovery steam generators, balance of plant, steam turbines, electrical power generation and distribution, power-plant efficiency, and power-plant systems. Basic math and science foundations are covered as well. These include elemental math; physics topics such as simple machines, momentum, gravity, energy, motion, electricity and magnetism, thermodynamics, and sound and light; and aqueous and non-aqueous chemistry fundamentals.

RATIONALE
There is a growing need in the world for qualified energy operators/technicians. Liberty University and TRAX, LLC Energy Solutions have partnered to meet this need through an innovative energy STEM cognate as part of the Bachelor of Science in Interdisciplinary Studies program. A STEM minor is available for all other majors. This course and its sister course, STEM101, serve as the core requirements in the minor/cognate.

I. PREREQUISITES
For information regarding prerequisites for this course, please refer to the Academic Course Catalog.

II. REQUIRED RESOURCE PURCHASES
Click on the following link to view the required resource(s) for the term in which you are registered: http://bookstore.mbsdirect.net/liberty.htm

III. ADDITIONAL MATERIALS FOR LEARNING
A. Computer with basic audio/video output equipment
B. Internet access (broadband recommended)
C. Microsoft Word
   (Microsoft Office is available at a special discount to Liberty University students.)

IV. MEASURABLE LEARNING OUTCOMES
Upon successful completion of this course, the student will be able to:
A. Perform basic pre-algebra and algebra mathematical problems.
B. Identify foundational physics principles related to simple machines, momentum, gravity, energy, motion, electricity and magnetism, thermodynamics, and sound and light.
C. Identify foundational principles in aqueous and non-aqueous chemistry.
D. Evaluate common safe work practices and demonstrate the ability to apply them in common industrial scenarios.
E. Describe the principles of operation of major industrial components including mechanical, electrical, and instrumentation systems.
F. Identify the main systems of a power plant and explain how they interrelate.
G. Perform routine procedures encountered in power plant control room operations.
H. Integrate biblical principles within the field of Industrial Energy.

V. COURSE REQUIREMENTS AND ASSIGNMENTS
A. Textbook readings
B. Course Requirements Checklist
   After reading the Syllabus and Student Expectations, the student will complete the related checklist found in Module/Week 1.
C. Discussion Board Forums (3)
   The student is required to provide a thread in response to the provided prompt for each forum. Each thread must be at least 300 words and demonstrate course-related knowledge. In addition to the thread, the student is required to reply to 2 other classmates’ threads. Each reply must be at least 150 words.
D. Textbook Assignments (6)
   The student will answer a series of questions based on the textbook readings.
E. TRAX Quizzes (28)
   Prior to taking each quiz the student must complete the TRAX module associated with the quiz (refer to the TRAX Course Schedule).
   Please note that the Combined Cycle Plant Startup and Combined Cycle Plant Shutdown TRAX Quizzes in week/module 16 are the culmination of the entire course. Each week/module prior to that builds up to these two quizzes. For this reason, each quiz is worth 100 points each. You will need to get 100 (a perfect score) on the TRAX quiz in order to get 100 points in Blackboard toward your final grade. If you score anything less than a perfect score on the TRAX quiz, then you will receive zero (0) points in Blackboard. In other words, there are only two possible scores for each of the Blackboard quizzes, 100 or 0. This means each quiz is worth a letter grade in the course. You will have three attempts on each of these two quizzes.
   The reason that the Combined Cycle Plant Startup and Combined Cycle Plant Shutdown TRAX Quizzes are weighted so heavily is twofold:
   1. Personnel may be injured or killed and equipment may be damaged or destroyed if power plant operations are not completed properly and in the correct sequence.
2. These two quizzes serve to demonstrate your full comprehension of the material presented in the previous 15 modules of the course.

VI. Course Grading and Policies

A. Points

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Requirements Checklist</td>
<td>10</td>
</tr>
<tr>
<td>Textbook Assignments (2 at 20 pts ea, 4 at 25 pts ea)</td>
<td>140</td>
</tr>
<tr>
<td>Discussion Board Forums (3 at 50 pts ea)</td>
<td>150</td>
</tr>
<tr>
<td>TRAX Quizzes (23 at 20 pts ea, 2 at 25 pts ea)</td>
<td>510</td>
</tr>
<tr>
<td>TRAX Quizzes (2 at 100 pts ea, Week 16)</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1010</strong></td>
</tr>
</tbody>
</table>

B. Scale

A = 900–1010  B = 800–899  C = 700–799  D = 600–699  F = 0–599

C. Late Assignment Policy

If the student is unable to complete an assignment on time, then he or she must contact the instructor immediately by email. Assignments that are submitted after the due date without prior approval from the instructor will receive the following deductions:

1. Late assignments submitted within one week of the due date will receive a 10% deduction.

2. Assignments submitted more than one week late will receive a 20% deduction.

3. Assignments submitted two weeks late or after the final date of the class will not be accepted.

4. Late Discussion Board threads or replies will not be accepted.

Special circumstances (e.g. death in the family, personal health issues) will be reviewed by the instructor on a case-by-case basis.

D. Disability Assistance

Students with a documented disability may contact Liberty University Online’s Office of Disability Academic Support (ODAS) at LUOODAS@liberty.edu to make arrangements for academic accommodations. Further information can be found at www.liberty.edu/disabilitysupport.
## Course Schedule

### STEM 201


<table>
<thead>
<tr>
<th>Module/Week</th>
<th>Reading &amp; Study</th>
<th>Assignments</th>
<th>Points</th>
</tr>
</thead>
</table>
| 1           | TRAX Readings 1 presentation | Course Requirements Checklist  
|             |                          | Class Introductions  
|             |                          | TRAX Quiz – Combined Cycle Fundamentals  
|             |                          | TRAX Quiz – Gas Turbine 1 | 10     |
| 2           | Tinsley: ch. 15  
TRAX Readings 1 presentation | Textbook Assignment 1  
|             |                          | TRAX Quiz – Gas Turbine 2 | 25     |
| 3           | Tinsley: ch. 16  
TRAX Readings 1 presentation | Textbook Assignment 2  
|             |                          | TRAX Quiz – Gas Turbine 3 | 20     |
| 4           | Tinsley: ch. 19  
TRAX Readings 1 presentation | Textbook Assignment 3  
|             |                          | TRAX Quiz – Chemistry  
|             |                          | TRAX Quiz – Gas Turbine 4 | 25     |
| 5           | TRAX Readings 1 presentation | DB Forum 1  
|             |                          | TRAX Quiz – Heat Recovery Steam Generator | 50     |
| 6           | TRAX Readings 1 presentation | TRAX Quiz – BOP 1  
<p>|             |                          | TRAX Quiz – BOP 2 | 20     |
| 7           | TRAX Readings 1 presentation | TRAX Quiz – BOP 3 | 20     |</p>
<table>
<thead>
<tr>
<th>MODULE/WEEK</th>
<th>READING &amp; STUDY</th>
<th>ASSIGNMENTS</th>
<th>POINTS</th>
</tr>
</thead>
</table>
| 8          | TRAX Readings 1 presentation | TRAX Quiz – BOP 4  
TRAX Quiz – BOP 5 | 20     |
| 9          | TRAX Readings 1 presentation | TRAX Quiz – Steam Turbine 1  
TRAX Quiz – Steam Turbine 2 | 20     |
| 10         | Tinsley: ch. 18  
TRAX Readings 1 presentation | Textbook Assignment 4  
TRAX Quiz – Electrical Power Generation & Distribution | 20     |
| 11         | TRAX Readings 1 presentation | DB Forum 2  
TRAX Quiz – Power Plan Efficiency | 50     |
| 12         | Tinsley: ch. 8  
TRAX Readings 1 presentation | Textbook Assignment 5  
TRAX Quiz – Fundamentals of Statistics  
TRAX Quiz – Cooling Water Systems | 25     |
| 13         | TRAX Readings 1 presentation | TRAX Quiz – Condensate Systems  
TRAX Quiz – Feedwater Systems  
TRAX Quiz – Condenser Vacuum Systems | 20     |
| 14         | TRAX Readings 1 presentation | DB Forum 3  
TRAX Quiz – HRSG & Steam Systems  
TRAX Quiz – Fuel Systems | 50     |
| 15         | Tinsley: ch. 21  
TRAX Readings 1 presentation | Textbook Assignment 6  
TRAX Quiz – Gas Turbine Systems  
TRAX Quiz – Steam Turbine Systems | 25     |
| 16         | TRAX Readings 1 presentation | TRAX Quiz – Combined Cycle Plant Startup  
(will receive either zero or full credit)  
TRAX Quiz – Combined Cycle Plant Shutdown  
(will receive either zero or full credit) | 100    |
|            |                          |                                                   | TOTAL 1010 |

**NOTE:** Each course week (except Module/Week 1) begins on Tuesday morning at 12:00 a.m. (ET) and ends on Monday night at 11:59 p.m. (ET). The final week ends at 11:59 p.m. (ET) on **Friday**.