THREE RIVERS COMMUNITY COLLEGE

INTRODUCTION TO ENGINEERING TECHNOLOGY · TCN K101 TLC

EXPANDED SYLLABUS FALL 2007

Instructor: Professor Mark Comeau, (885-2387,), email mcomeau@trcc.commnet.edu

Grade: Quizzes (4) 50% Mid term 15% Project 20% Final 15%

Description: Introduction to Technology will begin college-level technological studies and build student interest in further education and careers in technology fields. In particular the course will introduce students to:

- The history of technology
- The various fields of technology
- The purpose and application of technology
- The ethics of technology
- The limits and failures of technology

The course will be team taught by technology faculty from several disciplines at the college with frequent guest speakers from local industry, government agencies, and other education institutions. The course will be composed of modules containing projects based on problems and challenges faced by local industry and case-studies drawn from technology education resources such as NETEC, the South Carolina Advanced Technology Education Center for Excellence, or the Manufacturing Education Resource Center.

Field trips and laboratory exercises will give students opportunities to carry out measurements and apply technological principles. Measurement results will be available to the paired algebra course and to in class and homework exercises.

Method: Lectures, Slide Lectures, Simulations, Class Discussion

Week 1 (8/28)	**History of Technology** (with Hare) The Ancient World	Week 9 (10/23)	**Purpose & Application** (Decker) Data Collection & Analysis
Week 2 (9/04)	**History of Technology** (with Knowles) The Modern World	Week 10 (10/30)	**Purpose & Application** (Hammond) Communication
Week 3 (9/11)	**Fields of Technology** (with D. Gerwick) Building, Transportation, Utilities	Week 11 (11/06)	**Purpose & Application** Implementation & Execution
Week 4 (9/18)	**Fields of Technology** (with Lantz) Mechanical & Manufacturing	Week 12 (11/13)	**Ethics in Technology** (Benoit) Useful tool or weapon
Week 5 (9/25)	**Fields of Technology** (with Khan-Bureau) BioTech & Environment	Week 13 (11/20)	**Schedule Float** Thanksgiving Week
Week 6 (10/02)	**Fields of Technology** (with Volkov) Information, Hardware & Software	Week 14 (11/27)	**Limits & Failures** Desire, Need & Innovation
Week 7 (10/09)	**Purpose & Application** Need-to-Solution, the Design Process	Week 15 (12/04)	**Limits & Failures** Politics, Budgets and Safety
Week 8 (10/16)	**Purpose & Application** (with Donnelly) Applied Unit Measure	Week 16 (12/11)	**Course Wrap-up**

COURSE REQUIREMENTS:

Notebook

Students will assemble a notebook, to be made up of handouts distributed at the beginning of each class. A 3" "*Slant-ring"* notebook with plastic sheet protectors is recommended – this will be a good resource for future reference.

EXPANDED COURSE OVERVIEW

Introduction to Engineering Technology is unique in that it's an "applied" survey course, meaning that while students are exposed to the "why's" of the technological world, they will also explore the "how's" as a means to more fully understand technology at the concept level. In particular, the course will explore:

- The history of technology
- The various fields of technology
- The purpose and application of technology
- The ethics of technology
- The limits and failures of technology

The first section examines the origins of technological developments from a historical perspective. The term "technology" will be defined as the class explores cultures and the technologies they developed as a response to their needs and as shaped by their availabilities and limitations.

The second section examines the various fields of technology, their allied fields, and the elements that make them up. While gaining an understanding of the educational, training, and practice components of the various fields, students will gain an appreciation of the interdependence of technologies and their global integration.

Mankind discovered fire at a point in time, then discovered what it can do (its purpose), and then learned how to reproduce it. Once reproducible, it was used to make weapons, used *as* a weapon, and of course for countless other "applications". The purpose and application of technology will be looked at through the eyes necessity, growth and quality of life.

Hans Jonas comments on the ethics of technology in his book The Imperative of Responsibility: In Search of Ethics in the Technological Age (1979). Citing that technology itself is incapable of possessing moral or ethical qualities since technology is "merely tool making", Jonas instead refers to two basic subdivisions on ethics and technology:

- The ethics involved in the development of new technology -- whether it is always, never, or contextually right or wrong to invent and implement a technological innovation.
- Ethical questions that are exacerbated by the ways in which technology extends or curtails the power of individuals, how standard ethical questions are changed by the new powers.

These and other ideas on ethics and technology will be explored.

Finally, the limits and failures of technology will be considered through case studies including but not limited to Beauvais Cathedral, space flight, and the L'Ambiance Plaza collapse. At the core of this is the axiom "learning from one's mistakes", inherent technological limits, and political aspects that lend to failure.

COURSE OUTCOMES

Outcomes will be based on competencies in four areas: Applied mathematics and technology skills, communications, technological careers and practice, and college-level learning. These competencies will include:

1. Applications of math and technology skills
   - 1.1. A working familiarity with programmable calculators that students in math courses, including
     - 1.1.1. Power-of-10, engineering prefix type calcs (i.e. so many micro-something divided by so many nano-something)
     - 1.1.2. Use of graphical features to find mathematical solutions to problems
   - 1.2. Measurement techniques, including
     - 1.2.1. Accuracy and precision of measurements
     - 1.2.2. Adjustment of instruments to improve measurements, for example, expanding the scale of an instrument
     - 1.2.3. Rapid, order of magnitude assessment of results
   - 1.3. Measurement and manipulations with metric units
     - 1.3.1. Seven base units: length, mass, time, current, temperature, amount of substance (mole) & luminous intensity
     - 1.3.2. Use of metric prefixes
     - 1.3.3. Formation of derived units
     - 1.3.4. Unit conversions, including USCS conversions such as cubic meters to gallons
   - 1.4. Right angle trig and vector manipulation
   - 1.5. Problem solving
     - 1.5.1. Setting up word problems
     - 1.5.2. Writing equations to describe data reduction from measurements
     - 1.5.3. Experience with solving multi-step problems
   - 1.6. Use of an electronic spreadsheet to solve problems in introductory engineering and technology analysis
     - 1.6.1. Designing and using formulas and functions
     - 1.6.2. Creating and modifying charts.
     - 1.6.3. Unit conversions
     - 1.6.4. Simple statistical analysis
       - 1.6.4.1. Descriptive statistics
       - 1.6.4.2. Sorting, searching and analyzing data
       - 1.6.4.3. Graphing data and curve fitting
       - 1.6.4.4. Interpolation
     - 1.6.5. Solving algebraic equations
     - 1.6.6. Logical decisions
     - 1.6.7. Comparing economic alternatives and finding optimum solutions.
     - 1.6.8. Comparison of traditional and spreadsheet solutions including a description of underlying mathematics
2. Communications
   - 2.1. Reading and writing
     - 2.1.1. Understanding technology texts
     - 2.1.2. Summarizing and paraphrasing written material
     - 2.1.3. How to read and review a journal article
     - 2.1.4. Preparation of a technical memo to describe the results of a measurement
   - 2.2. How to do research for an engineering or technology term paper
   - 2.3. Working as a team
   - 2.4. Basic spoken presentations
3. Technology careers and practice
   - 3.1. Understanding the difference between education (why something works) and training (how something works).
   - 3.2. The difference between technology and engineering
   - 3.3. The fields of technology
   - 3.4. The interdisciplinary nature of technology
     - 3.4.1. The interdependence of technologies
     - 3.4.2. Use of technology from one field in another, for example sensors based on light, heat, current, voltage, pressure across technologies
   - 3.5. What jobs are available after graduation
   - 3.6. How to select and land a job
   - 3.7. Sources of failure in engineering and technology
4. College skills
   - 4.1. Expectations of college faculty
   - 4.2. How to study for a technology test
   - 4.3. Time management