**LEAD** and **SERVE** constitute the conceptual framework for all programs for professional educators in the College of Education at NC State. They are the touchstones that assure that our students graduate with the following:

- **LEAD:** four forms of knowledge; general pedagogy, content-specific pedagogical strategies, content or discipline knowledge, as well as knowledge of the context of education, including foundations, historical perspectives and school settings.
- **SERVE:** elements that show the range of skills and dispositions developed in our candidates; scholarly, ethical, reflective, valuing diversity and experienced in practical application of knowledge.

TED 556  Lab Management in TED

Department of Math, Science, and Technology Education
TED 556, Laboratory Management and Safety in TED

Syllabus Hardcopy

Course Prerequisite: Graduate Standing.

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**Course Prerequisite:** Graduate Standing

**Course Description:** Laboratory management, planning, and safety considerations for technology education. Analysis of recent research, environmental factors, development of a safety system, safety education, and legal implications. Use of student leaders in management of a safe learning environment.

**Course Objectives:** After successful completion of this course, students will be able to:

1. Analyze the layout of a technology laboratory and its equipment for improvement of functionality and safety.
2. Develop an effective safety plan which insures a safe laboratory environment and also teaches safety consciousness and safe practices to secondary school students.

3. Manage a technology laboratory effectively with appropriate policies, procedures, and techniques to insure safety, security for materials and equipment, regular maintenance, storage of student projects and work in progress, and a comfortable work environment.

4. Develop a student management system which incorporates student leaders to manage the day-to-day operation of the laboratory and simultaneously teaches students leadership skills.

5. Discuss and analyze recent research on laboratory management, safety instruction, and curriculum in their field.

6. Discuss the legal implications and requirements for teachers in school technology laboratories.

7. Improve the laboratory in which they teach with regard to safety, management, security, efficiency, and aesthetic factors.

The basic delivery method of this course is assymetrical internet with two face-to-face course meetings on the NCSU campus. Consult the "Important Dates" link for information on these meetings and interim due dates for assignments. You will be given a course CD which will contain some canned lessons for your use when appropriate--this was done so that you will not have to wait long periods of time for these image-intensive files to download from the web. Most of the course will actually consist of a series of assignments which you will complete to build a lab management portfolio--each of these assignments is carefully designed to allow you to develop something that will actually help you manage your lab and your students better. Check the "Assignments" link for details.

**Policies**

**Academic Integrity:** Your name (whether signed, written, printed, or typed) on any work submitted is your pledge that you have neither given nor received any unauthorized help on the work.

**Disability Services for Students:** Any student currently registered with DSS - Please provide a copy of accommodation letter and schedule an appointment to discuss academic accommodations. If you are not registered with DSS but feel that you qualify, contact the DSS office at (919) 515-7653 for more information.

**Punctuality and Attendance:** Attendance at two sessions is required, consult the "Important Dates" link. Assignments which are submitted late receive a ONE LETTER GRADE PENALTY.
**Topics of Study:** (NOTE: Students will study these topics independently as appropriate to complete the assignments in the required portfolio)

I. Introduction to laboratory management
   A. Analysis of the existing laboratory environment
   B. Analysis of model laboratory environments
   C. Recent research on lab management
   D. What should be done to improve your lab?

II. Design and layout of laboratories
   A. Analysis of existing laboratories
   B. Listing activities and equipment
   C. Dividing the lab into centers
   D. Space requirements for activities
   E. Space to insure safety
   F. Ancillary rooms
      1. Teacher's office
      2. Materials storage
      3. Tool and Equipment storage
      4. Student project storage areas

III. Matching the laboratory to the curriculum
   A. Curriculum development and research
   B. Topics to be studied
   C. Projects and activities
   D. Group interactions

IV. Safety considerations
   A. OSHA standards
   B. Fire inspection standards
   C. NCDPI Standards
   D. ITEA national standards

V. Liability
   A. Range of liability in school labs
   B. Tort insurance
   C. Importance of accurate recordkeeping
   D. Three factors considered in legal cases
      1. Duty of care
      2. Breach of duty
      3. Injury results directly from the breach of duty
   E. In loco parentis
   F. Age and sophistication level of the students
VI. A systems approach to safety
A. Inputs to the system
   1. Physical
   2. Human
   3. Environmental
   4. Processes
   5. Outside influences
B. Outputs from the system
   1. Safety consciousness among students
   2. A safe laboratory environment
   3. Student learning
   C. Interference
   D. Feedback

VII. Human factors in safety awareness and safe work habits
A. Cognitive factors
B. Psychomotor factors
C. Affective factors

VIII. Using student leadership
A. Teaching leadership skills
B. Using student leaders to manage the laboratory
C. Insuring a safe environment via student leaders
D. The co-curricular VSO approach

IX. Curriculum
A. Research basis for curricula
B. Incorporating topics from national standards
C. Learning activities centered on safety topics
D. Incorporating safety education and awareness in all topics of study
E. Development of specific learning modules with safety emphasis

Requirements and Grading

Course Requirements:
1. Attend first and last meetings of the class.
   8:00 PM Wed, Jan 13, 2010, RM 122 Poe
   8:00 PM Wed, May 5, 2010, RM 122 Poe
2. Read assigned texts and references.
3. View lessons on the course CD.
4. Complete assigned portfolio including series of specific assignments described herein.
5. Maintain communication with the instructor and class via the class list serve.
6. Final examination.

Grading:
A letter grade with +/- designation will be given at the end of the course. Some assignments will be graded via rubrics and given a +/- letter grade while others are quantitatively graded with numbers as follows: 100-98 = A+; 97-94 = A; 93-90 = A-; 89-86 = B+; 85-83 = B; 82-80 = B-; 79-76 = C+; 75-73 = C; 72-70 = C-; 69-66 = D+; 65-63 = D; 62-60 = D-; and below 60 = F. In cases where a rubric is used, all elements of the evaluation plan will be made clear in the assignment description.

Evaluation -- Portfolio = 95%  *
Examination = 5%

* Specific percentages for included assignments are given with the assignment descriptions.

**Assignments**

You will develop a lab management portfolio which consists of all of the following assignments.

**Details of Assignments in Portfolio:** (NOTE: See Target Dates outlined in next section)

1. Develop a scale drawing of your existing laboratory showing the locations of fixed and movable furniture and equipment. Identify each item and indicate which ones are movable. Mark traffic patterns and safety lanes. Indicate where materials are stored and show any ancillary rooms adjacent to the lab. You may use manual drawing methods or CAD drawing for any of the drawing assignments. Overlays may be used if desired to do various aspects of assignments 1, 2, and 3. (10%)

2. Indicate which areas of the laboratory are working well and which have problems that you need to solve. Prepare additional drawings or overlays for the original drawings which display your best solutions to the problems noted (within the physical limitations and walls of the existing structure). Though some aspects of this assignment may not be possible to implement due to budget and resources constraints, actually make the changes in the lab which are possible. Document these changes with before and after photographs (digital photos are preferred for ease of inclusion in the portfolio). Explain the impacts of the changes and reasons why those not accomplished cannot be done now. (10%)

3. Develop your ultimate "dream" laboratory for teaching the curriculum you now teach. In this assignment, take a realistic approach that assumes a new building is being planned and you are fortunate enough to consult with the architects about the design of your new lab facility. Draw another drawing showing the layout, traffic patterns, and placement of equipment just as in assignment number 1. Explain the features of this new facility and how it will be used. (10%)

4. Develop a long term plan for the continual upgrading of your existing laboratory. Include a rationale for purchase of new equipment, schedule for replacement of existing
items, facility modifications expected as the curriculum evolves, and other information which will help to make sure that the lab continues to serve your students well for the next 5 years. (5%)

5. Assume that you wish to conduct a project-based activity with your students. Identify the project and make a list of all of the materials needed to construct one prototype. Locate sources for purchasing each item in bulk and obtain pricing information. Develop an itemized budget to supply everything needed by a class of 24 students in building this project (one for each student). No project kits may be used. Explain how the actual order would be placed in your school and how the money would be allocated to you. (5%)

6. Improve some area of your laboratory in a significant way. Document your work with before and after photographs. Examples might include improvement of a storage area for materials, developing or improving a tool storage panel, development and production of jigs or fixtures to insure student success and safety in project construction, improvement of a lab station or module, facility modification for a disabled student, development of safety placards and machine guards, improvements to the aesthetic quality of the environment, installation of new equipment or furniture, or major restoration work on existing items. Discuss your ideas with the instructor and other class members before mid-semester to insure that the scope of your work is appropriate. Some students may need to complete a series of small improvements rather than one major one—seek the instructor's approval for any such plan. (10%)

7. Read the ITEA Safety Guide (one of your textbooks), visit the OSHA website, and study the lesson by your instructor on safety inspections which is located on the course CD. Conduct a full safety inspection of your laboratory. Identify problem areas and document these with before and after photographs. Any items which cannot be improved with existing resources, report to your school principal and establish a plan for future improvement or take the equipment out of service until it can be properly attended to. Document all findings and actions in writing within the portfolio. (10%)

8. Develop a student personnel system for management of your laboratory via student leaders. The co-curricular approach based upon a recognized VSO (TSA, FFA, VICA, TECA, or other as appropriate to your program) is highly recommended for this assignment. If no programs in your school use this approach, a visit to a program in another school which is doing so is recommended. Visit the website of the selected VSO for guidance and resources. Outline the duties of each officer and display them in a manner that informs students clearly. Determine a means to rotate positions so that all students have both leadership and follower experiences. Document these efforts appropriately. (10%)

9. Write specifications for purchase of a new piece of major equipment. Develop the specs such that centralized purchasing agents cannot substitute sub-par replacements to save money but must get what you really need. (5%)
10. Using the examples in the back of the ITEA Safety Guide and curricular information in the ITEA Standards document (your two textbooks), develop a laboratory-based hands-on activity for your students to complete which includes safety education as an integral part of the activity. You must include use of several of the safety forms in the guide (or ones of a similar nature which you develop) within the activity. Develop a full unit plan for this activity including the lesson plans, directions for the hands-on activity, handouts, media, assignments, etc. needed to conduct this learning activity with your students. Document this in all appropriate ways including photographs and copies of all items developed. (15%)

11. Organize and present the portfolio in an attractive hardcopy form. You must also maintain an electronic version. You will submit the hardcopy form on the last night of the class and make a brief presentation to your peers. You will keep the electronic form to use in completing your take-home examination. The following week you will turn in the electronic form of the portfolio and the examination in exchange for the graded hardcopy portfolio. The instructor will retain possession of the electronic form of the portfolio for use in instruction and in program evaluation. (5%)

12. Final take-home examination. This will be a hypothetical situational scenario in which you will react by writing your plans. Example possibilities include a sudden budget cut, a major donation, or documentation of safety procedures and instruction at the request of a new administrator. You will reference the information in the electronic version of your portfolio and all other course materials in developing your response to this scenario exam. (5%)

TARGET DATES: Interim draft versions of some of the above assignments are due on the following Target Dates. You may submit in hard copy via mail or personal delivery, or you may submit electronically via e-mail. Formative comments will be given by the instructor, but no formal grade will be given at this early juncture because revisions will be expected and likely.

February 17, 2010 -
First draft of items 1, 9, and 10

March 24, 2010 -
30% of the remaining assignments (of your own choosing)

Texts

**Required Texts:**


TED 556 Course CD. Prepared by instructor, includes lessons on Safety inspections, legal implications, time management, and additional resources. This is provided free of charge on the first class meeting.

**Important Dates**

**Required Attendance Dates:**

Attendance is required on first and last meetings of the class.
Wed., **Jan. 13, 2010**, RM 122 Poe, 8:00 PM
Wed., **May 5, 2010**, RM 122 Poe, 8:00 PM

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