# ETLS 571
# Automation Systems in the U.S. and Overseas

**Mr. Robert Johnson**
**Summer Semester 2009**

**Instructor:** Mr. Robert Johnson

**Time:** Section 01, Monday and Wednesday Evenings, 5:30 - 9:00 p.m.
Summer Semester 2009
Dates: 5/27, 6/1, 6/3, 6/10, 6/15, 6/22, 6/24, 6/29,
7/1, 7/06, 7/08, 7/13

**Location:** St. Paul, OSS Room LL10

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**Required Text:** Reading material (Red & Green Books) is on BlackBoard.

**Course Description:** This course provides an examination of automation and the processes and systems in which it works, with a strong emphasis on Medical Products. The course focuses on electronic, electromechanical, and mechanical manufacturing and also touches on highly automated molding and its tooling. Topics include flexible and hard automation within a variety of systems environments. The course moves from automation basics to designing for automation followed by a hard look at the processes such as group technology, sensors, and systems that allow for and improve automation. The course consists of lectures, guest speakers, videos, and visits to factories and laboratories.

**Course Objectives:** The first objective of the course is to familiarize the students with an overview of technological developments pertaining to the processes, automation and their systems in the United States and other countries of the world. A secondary objective is to explore and visit companies using these systems in order to see their practical

application in the economy of our region. A third objective is to develop an appreciation for the holistic process of automation, including an appreciation of the people element. A fourth objective is to improve our skill at selecting suitable automation for our purposes.

To achieve these ends, we employ a format that should be very much like a Ph.D. course at a major university. The material is drawn from conference proceedings, technical literature and real world experience. Students provide a great deal of the material. Although the topics for the student reports are usually preselected, there is considerable latitude for the students to add their own contributions. Participation is strongly encouraged. The emphasis is on the student making a contribution to their own learning and to the learning of others.

**Learning Outcomes:** **Upon completion of this course the student will demonstrate knowledge and understanding of automation:**

- By describing what strategy drives your product towards automation and to what level of automation (SE1).
- Be able to demonstrate understanding of designing the product for good automation (SE4).
- Show an understanding of the role that sensors, vision, good tooling, and other advanced systems play in creating good automation (SE3).
- Identify the importance of piece parts (in particular, plastic) that meet compliance for requirements of good automation (SE7).
- Be able to specify the people related rules one should follow in introducing automation (SE13, SE14).
- Demonstrate a good understanding of how to select the appropriate automation builder (SE1, SE9).
- Demonstrate a good understanding of developing and implementing automation projects (SE12, SE7).
- Understanding the role the FDA plays in Medical Products automation.

**Course Methodology:** During the course, we will use the text material and cases for about 30% of the material we cover. The additional material will come from invited speakers, student presentations and reports, discussion, and special handouts (sometimes offered by class members).

**Major Assignments:** Each Student will select a automation project for their term project –

see "Student Project" section below for details.

Beside the term project, the Student will make *one* class presentation. It should be for twenty minutes and accompanied by written report, plus any exhibits (copies should be made for the class).

The tours are an important part of this class and will require well-written trip reports.

**Grading Policy:** We encourage each student to formulate their own goals and objectives in taking this course and a PERSONAL GOAL STATEMENT will be collected during the third session. On-going evaluation of students by the instructor is limited. As is often the case in industry, class participants have to evaluate for themselves how they feel they are doing and whether or not they are achieving their objectives. The instructor will be helpful when asked to be involved. The experience of the class members in this course is usually extensive and at this stage in their education, the class participants have experienced several semesters of graduate study. The instructor will be happy to meet with anyone with specific questions.

The weighing of the student involvement is as follows:

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|---|---|
| Term paper and presentation | 40% |
| Tour papers | 35% |
| Presentation to class | 15% |
| Two Quizzes | 8% |
| Class Participation | 2% |

**Attendance Policy:** Students are expected to attend all class sessions. Circumstances that prevent attendance will be honored up to two instances. Absences in excess of two times may result in a lower grade for the course. Contact the instructor when a special situation arises. All absences require that the instructor be informed in advance.

**Academic Integrity:** All students are expected to understand and follow the University of St. Thomas policies on Academic Integrity. These are described at: www.stthomas.edu/engineering/graduate/policies

**Students with Disabilities:** Qualified students with documented disabilities who may need classroom accommodations should make an appointment with the Enhancement Program-Disability Services office during the first two weeks of the semester. Appointments can be made by calling 651-

962-6315 or in person in O'Shaughnessey Educational Center, Room 119.

**Instructor Bio:** Bob Johnson came to St. Thomas following a 40-year career in manufacturing at Honeywell. An expert in manufacturing automation and technology, Johnson has been a leading figure in professional manufacturing and engineering for many years. He was director of Honeywell's management development school, is a past president of the Society of Manufacturing Engineers, was elected to the SME College of Fellows in 1991, and is an industry representative to the Accreditation Board for Engineering Technology. Johnson won the Governor's Award for Commitment to Manufacturing Excellence in 1996. At St. Thomas, Johnson teaches courses in automation and medical technology.

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# Class Outline

**ETLS 571 Automation Systems in the U.S. and Overseas**

**Summer Semester 2009**

**Tentative Schedule**

| Date | Topics | Assignments |
|---|---|---|
| May 27<br>#1 | **1) Automation & its History**<br>**2) Project Presentation and Paper**<br>**3*) Automation Eng. (automation tape)*** | |
| June 1<br>#2 | **1) Design for Automation** and Processes<br>2) EDM, Sensors and Simulation<br>3) *CDT5171.4.D47 2005* | Readings for Session 2 on BlackBoard |
| June 3<br>#3 | **1) Tour and Lecture at plant**<br>**2) Vista Technology Inc.**<br>Molding and its tools – HS Mach./Rapid Mfg.<br>**3) Plastics Quiz**<br>4) *TJ1185.H54 2007* | Readings for #3 on BB |
| June 10<br>#4 | **Medical Device automation-what's different**<br>Guest speaker --- Medtronics<br>Nano Tech---*T174.7N36 2006* | Readings for #4 on BB |
| June 15<br>#5 | 1) **Tour Vision, Sensors, Robots & other *Discussion***<br>**2) *Automation Inc. Many Guest Speakers*** | Readings for #5 on BB |

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|---|---|---|
| | *3) TA 1634.M 34 2006* | |
| June 22<br>#6 | Human side of automation<br>Class Presentation | Readings for #6 on BB |
| June 24<br>#7 | 1) **Tour-Par Systems**<br>*T59.5.A44 2006* | Readings for #7 on BB |
| June 29<br>#8 | **1) Cells Robots**<br>**2) Group Tech Quiz**<br>***Class Presentations (4)*** | Readings for #8 on BB |
| July 1<br>#9 | **Tour Grayco - cells** | Readings for #9 on BB |
| July 6<br>#10 | **1) China Manufacturing and World Wide Manufacturing Competition -- Guest Speaker** *working in China* | Internet |
| July 8<br>#11 | **1)Tour TBD --- Zeiss** | Readings for #11 on BB |
| July 11<br>#12 | **Student Presentations**<br>***Guest Automation Eng.*** | |

**Student Project Presentation for ETLS 571**

Select an Assembly consisting of 4 to 8 parts for automatic assembly and test (can be from your operations or other).

Rates of production can be real or other, should have prime and fall back conditions if rates don't materialize.

Project should:

- Select the level of automation
- Select the type of automation
- Lay out the basic specifications of the machine - at least to the "napkin" level. This IS NOT the design of the automation. Some examples are:
  - Quality requirements of product, coming off assembly
  - Rates and performance of machine
  - Lay out any special requirement, e.g., Laser, vision, infrared & other.
- Include cost projections that support this automation project.

**From this material, develop a sales pitch to your management to sell project. (20 min. class presentation)**