J. Mark Barker, Ph. D. – F. Jay Taylor Undergraduate Teaching Award Information
Lecturer, Mechanical Engineering, College of Engineering and Science

1. Courses Taught

The tables below show my teaching load and retention rate for the last six years. I have chosen to show them grouped by academic year with the most recent year listed first. Each fall quarter I teach three sections of MEEN 382 Basic Measurements as three separate lab periods and a combined lecture period. I have grouped the labs into a single entry separate from the lecture. Retention data does not yet exist for the Spring 2011 quarter.

Course	SCH	Type	Time	Enrollment	Retention
YEAR 2010-2011					
Fall (111)					
ENGR 122-02 Problem Solving III	2	LLB	08:00-09:50TR	41	85%
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	68	91%
MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	68	
MEEN 400-02 MEEN Seminar	1	SEM	14:00-17:00M	25	96%
UNIV 100-16 University Seminar	1	SEM	10:00-11:15TR	31	100%
Winter (112)					
ENGR 121-01 Problem Solving II	2	LLB	08:00-09:50MW	36	94%
ENGR 121-04 Problem Solving II	2	LLB	12:00-13:50TR	35	94%
ENGR 222-01 Thermodynamics I	3	LLB	10:00-11:50MWF	63	84%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00R	17	100%
Spring (113)					
ENGR 222-01 Thermodynamics I	3	LLB	14:30-16:20MWF	45	--
MEEN 353-02 Heat Transfer	3	LEC	09:30-10:45MWF	25	--

YEAR 2009-2010					
Fall (101)					
ENGR 122-02 Problem Solving III	2	LLB	08:00-09:50TR	32	94%
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	57	100%
MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	57	
MEEN 400-02 MEEN Seminar	1	SEM	14:00-17:00M	35	100%
UNIV 100-16 University Seminar	1	SEM	10:00-11:15TR	36	100%
Winter (102)					
ENGR 121-H13 Problem Solving II	2	LLB	14:00-15:50MW	18	94%
ENGR 121-04 Problem Solving II	2	LLB	12:00-13:50TR	36	97%
ENGR 222-01 Thermodynamics I	3	LLB	10:00-11:50MWF	43	79%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00R	26	100%
Spring (103)					
ENGR 122-H11 Problem Solving III	2	LLB	10:00-11:50TR	24	100%
ENGR 222-01 Thermodynamics I	3	LLB	10:00-11:50MWF	43	70%
ENGR 222-02 Thermodynamics I	3	LLB	14:00-17:00TWR	43	72%
Summer (104)					
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	33	82%

YEAR 2008-2009					
Fall (091)					
ENGR 120-05 Problem Solving I	2	LLB	08:00-09:50MW	42	79%
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	70	100%
MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	70	

Course	SCH	Type	Time	Enrollment	Retention
MEEN 400-02 MEEN Seminar	1	SEM	14:00-17:00M	35	100%
UNIV 100-17 University Seminar	1	SEM	10:00-11:15TR	28	100%
Winter (092)					
ENGR 121-H13 Problem Solving II	2	LLB	14:00-15:50MW	19	100%
ENGR 121-01 Problem Solving II	2	LLB	08:00-09:50MW	38	89%
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	19	84%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00R	16	100%
Spring (093)					
ENGR 120-02 Problem Solving I	2	LLB	14:00-15:50TR	31	65%
ENGR 122-H11 Problem Solving III	2	LLB	10:00-11:50TR	17	100%
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	43	93%
Summer (094)					
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	30	93%

YEAR 2007-2008					
Fall (081)					
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	61	97%
MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	61	
MEEN 400-02 MEEN Seminar	1	SEM	14:00-17:00M	32	100%
Winter (082)					
ENGR 121-01 Problem Solving II	2	LLB	08:00-09:50MW	35	94%
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	30	77%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00R	16	100%
Spring (083)					
ENGR 122-H11 Problem Solving III	2	LLB	10:00-11:50TR	15	100%
ENGR 222-01 Thermodynamics I	3	LLB	14:30-16:20MWF	44	93%
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	41	93%
Summer (084)					
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	15	93%

YEAR 2006-2007					
Fall (071)					
ENGR 120-03 Problem Solving I	2	LLB	08:00-09:50TR	38	97%
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	64	100%
MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	64	
MEEN 400-02 MEEN Seminar	1	SEM	14:00-17:00M	31	100%
UNIV 100-15 University Seminar	1	SEM	08:00-09:15MW	30	100%
Winter (072)					
ENGR 222-01 Thermodynamics I	3	LLB	14:30-16:20MWF	17	88%
ENGR 222-02 Thermodynamics I	3	LLB	08:00-09:50TR*F	38	95%
Spring (073)					
ENGR 222-01 Thermodynamics I	3	LLB	14:30-16:20MWF	40	95%
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	42	95%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00R	33	100%
Summer (074)					
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	13	92%

YEAR 2005-2006					
Fall (061)					
MEEN 382-Basic Measurements	1	LEC	11:00-12:15F	68	99%

MEEN 382-01,02,03 Measurements	3	LAB	14:00-17:00TWR	68	
MEEN 451-01 Thermal Design LEC	2	LEC	10:00-11:15TR	24	92%
MEEN 451-01 Thermal Design LAB	1	LAB	14:00-17:00F	24	
UNIV 100-20 University Seminar	1	SEM	12:30-13:45TR	29	100%
Winter (062)					
ENGR 121-H12 Problem Solving II	2	LLB	08:00-09:50TR	14	93%
ENGR 220-01 Statics/Mech Materials	3	LLB	12:30-14:20MWF	39	74%
ENGR 220-02 Statics/Mech Materials	3	LLB	10:00-11:50T*TR	25	80%
Spring (063)					
ENGR 122-H12 Problem Solving III	2	LLB	10:00-11:50TR	16	100%
ENGR 222-02 Thermodynamics I	3	LLB	14:30-16:20MWF	41	90%
MEEN 486-01 MEEN Laboratory	1	LAB	14:00-17:00T	25	100%
Summer (064)					
ENGR 222-02 Thermodynamics I	3	LLB	10:00-11:50MWF	18	89%

2. Instructor Evaluations

The tables below show my teaching evaluations for the Fall 2010 and Winter 2011 academic terms.

	ENGR122	MEEN 382 (by LAB section)			MEEN400
Fall 2010		-01	-02	-03	
appropriate exams	3.7	3.5	3.3	3.5	4.0
organized presentations	3.4	2.5	2.7	3.1	3.8
expressiveness	3.6	3.6	3.7	3.4	3.9
stimulates interest	3.6	2.8	3.0	2.7	3.8
explains difficult material	3.5	2.5	2.7	2.9	4.0
concerned about learning	3.4	2.7	3.0	3.1	3.8
willing to answer questions	3.7	3.2	3.2	3.5	3.8
gained greater understanding	3.6	2.8	2.8	2.8	3.5
accomplished class purposes	3.6	2.9	3.0	2.9	4.0
Rating of Instructor	3.5	2.9	3.1	2.7	3.8

	ENGR121-1	ENGR122-4	ENGR222	MEEN486
Winter 2011				
appropriate exams	3.3	3.3	3.8	3.8
organized presentations	3.1	3.3	3.6	3.5
expressiveness	3.6	3.5	3.8	3.8
stimulates interest	3.2	3.5	3.6	3.4
explains difficult material	3.0	3.2	3.7	3.5
concerned about learning	3.1	3.3	3.6	3.4
willing to answer questions	3.2	3.3	3.9	3.8
gained greater understanding	3.2	3.3	3.8	3.3
accomplished class purposes	3.6	3.3	3.8	3.5
Rating of Instructor	3.2	3.2	3.7	3.5

3. Significance of Undergraduate Teaching

I believe that undergraduate teaching is the most important thing we do at Louisiana Tech. Our primary mission is to educate our students. The main purpose of Louisiana Tech is to produce well-educated students who are ready to develop into productive adults who apply their knowledge with uncommon skill. Tech has earned a reputation of excellence in producing these

graduates because undergraduate education is valued here. Tech attracts faculty who are interested in helping students develop into this type of outstanding graduate, thus undergraduate education continues to be very important at Louisiana Tech even as we break into new research frontiers.

4. Teaching Innovations

As the knowledge base of society changes, as students and their expectations change, as the needs of employers change, we must evaluate our education methods and their effectiveness. This is necessary to ensure that Louisiana Tech continues to be a leader in undergraduate education. I have been active in the improvement of undergraduate education at Louisiana Tech.

I have been PI or co-PI on enhancement grants from the Louisiana Board of Regents Support Fund for specific courses in the Mechanical Engineering curriculum. These include MEMT 313 Fluid Mechanics and MEEN 382 Basic Measurements. These grants were primarily for equipment to improve laboratory experiments.

In the fall, I teach MEEN 382 Basic Measurements, a course with a combined lecture and 3 individual laboratory sections. The lab consists of an introduction to the lab activity followed by a couple of hours for the students to execute the lab activity. During this latter period, I am available to the students for assistance. I was interested in exploring various ways of interacting with the students in these labs. In 2001 a CEnIT grant provided funds to explore using video conferencing equipment in this course. The faculty member would be available for assistance via web-based video conferencing. It was an interesting experience in video communication, but it did not provide a significant benefit to either students or faculty, so this is no longer used in that course.

In late 2002, Professor David Hall and I received funding from CEnIT and permission from the College of Engineering and Science to develop a pilot version of ENGR 122 Problem Solving III for the Spring 2003 quarter. This pilot course emphasized hands-on activities focused on product development and entrepreneurial activity. A variety of projects were developed by these freshman students. Some of the projects focused on improved mobility aids for the visually impaired. The Louisiana Center for the Blind helped pay travel expenses for two students to demonstrate their product at the National Federation of the Blind Convention in Louisville, KY. A paper that chronicled these activities was presented at the 2004 ASEE Annual Conference and Exposition. From this seed grew the Living With The Lab (LWTL) curriculum.

Dr. Hall and I and others including Dr. Kelly Crittenden, Dr. Davis Harbour, and Dr. Mike Swanbom worked to further develop this curriculum. All freshman engineering students now participate in a 3-quarter Living With The Lab course sequence: ENGR 120, ENGR 121, and ENGR 122. These courses combine engineering and science fundamentals, engineering analysis, component selection, component fabrication, and hands-on project experience. The freshman design expo is held late in the spring quarter, and students present their projects to the public.

As the curriculum development continued, we aligned the curriculum with the National Academy of Engineering's "Engineer of 2020", with the goal of producing engineering graduates ready for the challenges in that decade. The National Science Foundation funded a $500,000 grant in August of 2006, providing funds for equipment purchase and faculty release time to continue the development of this curriculum. As part of this grant, funds were provided for internal workshops to train additional Tech engineering and science faculty for delivery of this curriculum to a large (and growing) freshman engineering population.

Funding was also provided for an external workshop. Louisiana Tech hosted a five day workshop in July, 2009. Travel and lodging for selected faculty from other universities was provided by the NSF grant. These faculty members participated in many of the freshman engineering student activities. Discussions provided valuable insight about the content and direction of this curriculum. The home university of one of the workshop participants is adopting our Living With The Lab curriculum for their freshman engineering students.

5. Mentoring undergraduate students

I mentor undergraduate students outside of class. I am the advisor for the Louisiana Gamma chapter of Tau Beta Pi, the engineering honor society. I am the co-advisor from the College of Engineering and Science for Bulldog Entrepreneurs (formerly ABESE: Association of Business, Engineering, and Science Entrepreneurs). I serve as the academic advisor for about 30 to 40 Mechanical Engineering students each quarter. I also serve as the academic advisor for students in my sections of ENGR 120 and 121. I teach UNIV 100 regularly. In all of these activities I have the opportunity to encourage students in their academic and extracurricular pursuits. I value the opportunity to visit with them about their professional goals, and to share with them my experiences and the experiences of others I have had contact with over the years.

I also mentor students in class. As a mechanical engineering student here at Tech (BSME, 1984), I learned many things in class from my faculty mentors. Many of these lessons were not in the textbooks. These lessons include how to professionally relate to others at work, such as technicians working for an engineer. I make it a point to include in my classes these valuable lessons that are not in our textbooks.

6. Publications, papers, presentations

This section lists selected publications related to undergraduate education.

Barker, M., *Better Preparing Students for Basic Measurements Courses*, Proceedings of the ASEE Annual Conference, Montreal, 2002.

Barker, J. M., Hall, D., Teaching *Innovative Product Development Skills to Freshman Engineering Students*, Proceedings of the ASEE Annual Conference, Salt Lake City, 2004.

Hall, D., Barker, M., *Living with the Lab - Boosting Experiential Learning and Creativity in 1st Year Engineering Students*, Intelligent Automation and Soft Computing, **13** (1), 2007, 3-18.

Hall, D.E., Barker, J.M., *et. al.*, *Living With The Lab: A Curriculum to Prepare Freshman Student to Meet the Attributes of "The Engineer of 2020"*, Proceedings of the ASEE Annual Conference, Pittsburgh, 2008. 2nd Place Best Paper Award, Freshman Program Division; this paper was also invited for presentation and publication at the 63rd ASEE EDGD Midyear Conference held January 4-7 in Berkeley, California

Hall, D., Barker, M., Nelson, J., *Living with the Lab: Update on the Second Year of Full Implementation for Over 400 First-Year Engineering Students*, American Society for Engineering Education Annual Conference and Exposition, June 2009.

Crittenden, K., Hall, D., Barker, M., Brackin, P., *First-Year Design Experience: Assembling the "Big Picture" Through Innovative Product Design*. American Society for Engineering Education Annual Conference and Exposition, June 2009.