

# Quinsigamond Community College

*Academic Affairs*  
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## MEMORANDUM

**TO:** Academic Affairs Committee  
**FROM:** Pat Toney  
Vice President of Academic Affairs  
**DATE:** October 3, 2008  
**RE:** Academic Affairs Committee Meeting

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The Academic Affairs Committee will meet as scheduled on Tuesday, October 14, 2008 at 2 p.m. in Room 107A.  
The agenda is as follows:

1. Curriculum to be considered at this time:

**Business & Technology Division**

AUT 133 Suspension, Steering and Alignment – Add prerequisites  
FIN 216 Small Business Finance – New Course

**Health Care & Human Services Division**

SCI 107 Science of Technology: Vision and Light – New Course  
SCI 108 Science of Technology: Hearing and Sound – New Course

Documentation is attached.

**QUINSIGAMOND COMMUNITY COLLEGE  
COURSE APPROVAL/REVISION  
CURRICULUM APPROVAL/REVISION  
PROGRAM REVISION  
ACTION FORM**

1. **Course/Program Title:** Automotive Technology

2. **Originator:** Donald Morin

**Date:** June 4, 2008

3. **Academic Unit Dean:** Kathy Rentsch

**Date:** 9.18.08

**Recommendation:** Add AUT 101 Intro to Automotive Service and AUT 103 Tool Operations as pre-requisites to AUT 133 Suspension, Steering and Alignment.

**Rationale:** Presently the course has no pre-requisites and any student with little or no automotive background, experience or safety training can enroll. The main reasoning is due to personal safety of the student and familiarization with the automobile, tools and equipment.

This recommendation was approved unanimously at the September 18, 2008 Business & Technology Division meeting.

4. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**Academic Affairs Staff:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

5. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**VP/Academic Affairs:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

6. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**Academic Affairs Committee** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

7. **Approved:** \_\_\_\_\_ **Not Approved:** \_\_\_\_\_

**VP/Academic Affairs:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

Quinsigamond Community College

Request For A New Course Or Course Revision

Course Discipline: Automotive Technology Division: Business and Technology

Date : June 4, 2008

Course Title Suspension, Steering and Alignment

Course Number AUT 133\_\_\_\_\_

Lecture Hours \_\_\_\_\_ Credits 3 Clinic Hrs \_\_\_\_\_ Lab Hrs \_\_\_\_\_

Prerequisite changing Co requisite none

Application As Elective? \_\_\_\_\_

Course Effective Term \_\_\_\_\_ Year \_\_\_\_\_

1) Does This Course Replace Another Course? \_\_\_\_\_ Yes x No

Which Course? \_\_\_\_\_

If Revision, Rationale For Revision Should Be Given Here:

Presently the course has no pre-requisites and any student with little or no automotive background, experience or safety training can enroll. The main reasoning is due to personal safety of the student and familiarization with the automobile, tools and equipment.

2) Is Course Content Similar To Other Courses Now Offered? \_\_\_\_\_ Yes x No  
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Automotive Technology Students \_\_\_\_\_

4) Required Course? x Yes \_\_\_\_\_ No Required For Auto Tech Students

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? \_\_\_\_\_ Yes x No Number Of Additional Staff \_\_\_\_\_

7) Additional Space? \_\_\_\_\_ Yes x No Amount Of Additional Space \_\_\_\_\_

8) Additional Equipment? \_\_\_\_\_ Yes x No Additional Cost \$ \_\_\_\_\_

9) Additional LRC Materials? \_\_\_\_\_ Yes x No Estimated Cost \$ \_\_\_\_\_

Signature: \_\_\_\_\_ (Library Services Director)

Text And Related Materials

Base Steering and Suspension Self Study FCS-12955-REF

Base Suspension and steering Student Guide FCS-1295-REF

Steering, Suspension and Alignment FCS-12957-DL

10) Attach Course Description And Outline To This Page

## Course Description

### Current

#### **AUT 133 Suspension, Steering, & Alignment (AT 122) - 3 credits**

This course examines conventional suspension, air suspension, and programmed/automatic ride control systems. Students learn the theory and operation of basic steering systems, rack and pinion steering systems, and variable and electronic steering systems. Topics include two - four-wheel alignment and use of specialized steering equipment. Students gain an entry-level knowledge of suspension and steering as the foundation for performing comprehensive vehicle suspension and steering performance evaluations and repairs. S

### Proposed

#### **AUT 133 Suspension, Steering, & Alignment (AT 122) - 3 credits**

This course examines conventional suspension, air suspension, and programmed/automatic ride control systems. Students learn the theory and operation of basic steering systems, rack and pinion steering systems, and variable and electronic steering systems. Topics include two - four-wheel alignment and use of specialized steering equipment. Students gain an entry-level knowledge of suspension and steering as the foundation for performing comprehensive vehicle suspension and steering performance evaluations and repairs.

**Prerequisite: AUT 101, AUT 103. S**

## Quinsigamond Community College Automotive Technology Program

Instructor: Rodney Tankis  
Location: Blackstone Valley Tech Auto Lab  
Contact: 508-592-4883  
E-mail: [rtankis@gcc.mass.edu](mailto:rtankis@gcc.mass.edu)

### Course Outline

#### **AUT 133 Steering, Suspension and Alignment**

**3 Credits**

This course examines conventional suspension, air suspension, and programmed/automatic ride control systems. Students learn the theory and operation of basic steering systems, rack and pinion steering systems, and variable and electronic steering systems. Topics include two - four-wheel alignment and use of specialized steering equipment. Students gain an entry-level knowledge of suspension and steering as the foundation for performing comprehensive vehicle suspension and steering performance evaluations and repairs.

**Prerequisite: AUT 101, AUT 103. S**

### Student Objectives

Upon completion of this course, the student should have entry level knowledge of steering and suspension systems. The student should also have knowledge of proper methods of component replacement, alignment as well as diagnostic and repair procedures.

### Instruction Procedures

This class will be presented as a lecture and lab series. Classroom sessions will cover theory and operation as well as diagnostic and repair procedures. Lab sessions will give the proper hands on practice to reinforce classroom topics. This course will be 50% lecture and 50% hands on. The final exam will consist of a fifty question written exam and hands on final consisting of performance and identification of components.

### Grading

Attendance:	15%
Quizzes:	25%
Written Exam:	30%
Hands on Final	<u>30%</u>
	100%

### Class Schedule

#### **Week 1 Conventional Suspension Systems**

- Principles of suspension systems
- Location and function of major components
- Macpherson strut systems
- Modified Macpherson strut systems
- Short arm/Long arm suspension
- Rear suspension systems
- Suspension system diagnosis and service
- Quiz

### **Week 1 Lab Session**

- Diagnosis and testing of suspension systems
- Replacement of major components
- Tire and wheel run-out
- Tire and wheel balancing and replacement

### **Week 2 Steering Systems**

- Basic steering systems
- Manual steering
- Power steering
- Steering systems service
- Quiz

### **Week 2 Lab Session**

- Functional Testing
- Component replacement

### **Week 3 Alignment Procedures**

- Pre-alignment checks
- Hunter and Rotunda computer alignment training
- Passenger car adjustments
- Light truck adjustments

### **Week 3 Lab Sessions**

- On-car two and four wheel alignments

### **Week 4 Introduction to Electronic Steering and Suspension Systems**

- Programmed Ride Control Systems
- Automatic Ride Control Systems
- Rear Load Leveling Systems
- Air Suspension Systems
- Rear Load Leveling Systems

### **Week 4 Lab Sessions**

- System operation
- Components and functionality
- Diagnosis and Testing

## Week 5 Review and Final Exams

- Review of covered material
- 50 Question Final Exam
- 2 vehicles to diagnose and repair
- 10 items to identify and determine good or bad

## Course Evaluation

Students will be evaluated and graded through a series of quizzes, hands-on lab participation, lecture participation and, attendance and written and hands-on final exams.

## Attendance

Students are expected to attend ALL classes and labs sessions. One unexcused absence will be allowed for the semester. Excessive absence will cause a reduction in final grade. If you can not make it to class, I can be reached by phone or email. See top of syllabus. Missing class due to inclement weather may not be counted.

## Text Books

Books must be purchased at the QCC bookstore and you will need to bring the receipt to us to receive your books. We have them here.

Base Steering and Suspension Self Study FCS-12955-REF

Base Suspension and steering Student Guide FCS-1295-REF

Steering, Suspension and Alignment FCS-12957-DL

**Note:** All contents of this syllabus are subject to change

**AUTOMOTIVE MAINTENANCE AND LIGHT REPAIR – Certificate**

Current

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
<b>Cluster A</b>						
Introduction to Automotive Service	AUT 101	F			1	
Tool Operations	AUT 103	F			1	
Automotive Electrical Systems	AUT 111	F			4	
Brake Systems	AUT 131	F			3	
<b>Cluster B</b>						
Basic Gasoline Engines	AUT 121	S			4	AUT 101, AUT 103
Engine Testing/Performance Analysis	AUT 125	S			4	
<b>Cluster C</b>						
Suspension, Steering, and Alignment	AUT 133	SU			3	AUT 121
Climate Control System	AUT 141	SU			3	
<b>Total credits required</b>					<b>23</b>	

Proposed

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
<b>Cluster A</b>						
Introduction to Automotive Service	AUT 101	F			1	
Tool Operations	AUT 103	F			1	
Automotive Electrical Systems	AUT 111	F			4	
Brake Systems	AUT 131	F			3	
<b>Cluster B</b>						
Basic Gasoline Engines	AUT 121	S			4	AUT 101, AUT 103
Engine Testing/Performance Analysis	AUT 125	S			4	
<b>Cluster C</b>						
Suspension, Steering, and Alignment	AUT 133	SU			3	AUT 101, AUT 103 AUT 121
Climate Control System	AUT 141	SU			3	
<b>Total credits required</b>					<b>23</b>	

**AUTOMOTIVE TECHNOLOGY - Associate in Applied Science**  
**Current**

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Cluster A						
Introduction to Automotive Service	AUT 101	F			1	
Tool Operations	AUT 103	F			1	
Automotive Electrical Systems	AUT 111	F			4	
Brake Systems	AUT 131	F			3	
Introduction to English Composition*	ENG 100	F/S/SU			3	
Cluster B						
Basic Gasoline Engines	AUT 121	S			4	AUT 101, AUT 103
Engine Testing/Performance Analysis <sup>4</sup>	AUT 125	S			4	AUT 101, AUT 103
English Composition & Literature I	ENG 101	F/S/SU			3	ENG 100
Social Science Elective	---	F/S/SU			3	ENG 100 or approp place score
Cluster C						
Suspension, Steering, & Alignment	AUT 133	S			3	AUT 121
Climate Control System	AUT 141	S			3	
Field Experience & Cooperative Education in Automotive Technology <sup>2,6</sup> or Elective	---	F/S/SU			3	
Cluster D						
Automotive Drive Train	AUT 251	F			3	AUT 121
Automotive Transmission & Transaxle	AUT 253	F			4	Coreq-AUT 251
English Composition & Literature II	ENG 102	F/S/SU			3	ENG 101
Management Elective	---				3	
Cluster E						
Basic Automotive Electronics <sup>3</sup>	AUT 113	S			3	AUT 111
Electronic Powertrain Control Systems <sup>1,5</sup>	AUT 211	S			5	Coreq-ENG 101
Science Elective**	SCI ---	F/S/SU			3/4	
Speech Communication Skills	SPH 101	F/S/SU			3	
<b>Total credits required</b>					<b>62-63</b>	

**AUTOMOTIVE TECHNOLOGY - Associate in Applied Science**  
Proposed

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Cluster A						
Introduction to Automotive Service	AUT 101	F			1	
Tool Operations	AUT 103	F			1	
Automotive Electrical Systems	AUT 111	F			4	
Brake Systems	AUT 131	F			3	
Introduction to English Composition*	ENG 100	F/S/SU			3	Appropriate placement score
Cluster B						
Basic Gasoline Engines	AUT 121	S			4	AUT 101, AUT 103
Engine Testing/Performance Analysis <sup>4</sup>	AUT 125	S			4	AUT 101, AUT 103
English Composition & Literature I	ENG 101	F/S/SU			3	ENG 100
Social Science Elective	---	F/S/SU			3	ENG 100 or approp place score
Cluster C						
Suspension, Steering, & Alignment	AUT 133	S			3	<b>AUT 101, AUT 103</b>
Climate Control System	AUT 141	S			3	AUT 121
Field Experience & Cooperative Education in Automotive Technology <sup>2,6</sup> or Elective	---	F/S/SU			3	Approval of Program Coordinator
Cluster D						
Automotive Drive Train	AUT 251	F			3	AUT 121
Automotive Transmission & Transaxle	AUT 253	F			4	Coreq-AUT 251
English Composition & Literature II	ENG 102	F/S/SU			3	ENG 101
Management Elective	---				3	
Cluster E						
Basic Automotive Electronics <sup>3</sup>	AUT 113	S			3	AUT 111
Electronic Powertrain Control Systems <sup>1,5</sup>	AUT 211	S			5	
Science Elective**	SCI ---	F/S/SU			3/4	
Speech Communication Skills	SPH 101	F/S/SU			3	Coreq-ENG 101
<b>Total credits required</b>					<b>62-63</b>	

**QUINSIGAMOND COMMUNITY COLLEGE  
COURSE APPROVAL/REVISION  
CURRICULUM APPROVAL/REVISION  
PROGRAM REVISION  
ACTION FORM**

1. **Course/Program Title:** FIN 216 – Small Business Finance
2. **Originator:** Michael Araujo **Date:** June 23, 2008
3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.18.08

**Recommendation:** The Business Department recommends approval of the course FIN 216 Small Business Finance, and introduction in Spring 2009.

**Rationale:** This course is part of the Entrepreneurship Certificate program approved in Spring 2008 and would add to our students' understanding of the financial aspects that relates to the capital formation for a small business start-up.

This recommendation was approved unanimously at the September 18, 2008 Business & Technology Division meeting.

4. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**Academic Affairs Staff:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

5. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**VP/Academic Affairs:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

6. **Recommended:** \_\_\_\_\_ **Not Recommended:** \_\_\_\_\_

**Academic Affairs Committee** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

7. **Approved:** \_\_\_\_\_ **Not Approved:** \_\_\_\_\_

**VP/Academic Affairs:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Comments:**

**Quinsigamond Community College  
Request for a New Course or Course Revision**

Course Discipline Finance Division Business & Technology Date June 23, 2008

Course Title Small Business Finance

Course Number FIN 216

Lecture Hours 3 Credits 3 Clinic Hrs 0 Lab Hrs 0

Prerequisite ACC 101 Corequisite none

Application As Elective? Elective, Business or General

Course Effective Term Spring Year 2009

1) Does This Course Replace Another Course? \_\_\_\_\_ Yes  No

Which Course? \_\_\_\_\_

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? \_\_\_\_\_ Yes  No  
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in Business/Entrepreneurship Certificate or degree

4) Required Course?  Yes \_\_\_\_\_ No Required For Certificate Option

5) Expected Enrollment Per Term 20 Per Year 40

6) Additional Staff? \_\_\_\_\_ Yes  No Number Of Additional Staff \_\_\_\_\_

7) Additional Space? \_\_\_\_\_ Yes  No Amount Of Additional Space \_\_\_\_\_

8) Additional Equipment?  Yes  No Additional Cost \$ \_\_\_\_\_

9) Additional LRC Materials? \_\_\_\_\_ Yes  No Estimated Cost \_\_\_\_\_

Signature: \_\_\_\_\_ (Library Services Director)

10) Text And Related Materials Entrepreneurial Finance, J. Chris Leach and Ronald Melicher;  
Thomson:South-Western Publishers

11) Attach Course Description And Outline To This Page

**QUINSIGAMOND COMMUNITY COLLEGE**  
**FORMAT FOR SUBMISSION OF COURSE PROPOSALS**

**COURSE DESCRIPTION:**

FIN 216 Small Business Finance

3 credits

The course emphasizes a practical approach to small business finance that allows students to master the basic elements of financial management. Topics include principles of entrepreneurial finance, preparing pro-forma financial forecasts, measuring and evaluating financial performance, business financial planning, as well as financing options available to small business owners. This course is intended for individuals interested in starting a small business.

Prerequisites: ACC 101

**A. Desired Student Outcomes/Instructional Objectives:**

1. Define entrepreneurship.
2. Identify and describe the seven principles of entrepreneurial finance.
3. Compare and contrast entrepreneurial finance with personal finance.
4. Articulate the various stages of a successful venture's life cycle AND the types of financing by life cycle stage.
5. Describe the primary components of a typical business plan.
6. Compare and contrast the various forms of business organization.
7. Identify the risks and characteristics of a limited liability company (LLC).
8. Articulate the use of patents, trademarks, & copyrights to protect intellectual property.
9. Discuss financial bootstrapping and the use of business angels.
10. Describe and prepare a basic balance sheet.
11. Describe and prepare a basic income statement.
12. Articulate the role of financial statements for internal/external usage.
13. Prepare a cash flow statement and explain how it monitors a venture's cash position.
14. Describe and perform a breakeven analysis.
15. Describe how financial ratios are used to monitor a venture's performance.
16. Compare and contrast the various calculations used to perform ratio analysis.
17. Explain how ratio analysis is used by an entrepreneur.
18. Describe and calculate liquidity ratios, leverage ratios, and profitability ratios commonly used to assess the financial health of a business venture.
19. Construct a cash budget.
20. Describe how projected (pro forma) statements of cash flow relate to cash budgets.
21. Explain why pro forma statements are important to the entrepreneur.
22. Articulate the concept of a sustainable sales growth rate.
23. Connecting sales growth rates to the amount and timing of additional funds needed.
24. Understand the process for obtaining additional funds to support the sales growth rate.
25. Describe how to use the percentage-of-sales method to prepare financial plans.
26. Discuss the various ways that a venture capitalist can provide financing and services to an emerging business venture.
27. Identify relevant sources of debt-oriented financing.
28. Determine how to access government loan guarantee and micro-credit program financing.
29. Identify several potential sources of funding for minority-owned enterprises.
30. Explain the differences between venture lending & leasing from traditional lending & leasing.

DRAFT

**B. Course Requirements:**

1. Students are expected to attend all classes. Students that must miss class are required to make-up all missed work. Students should also email instructor as soon as possible to report a class absence and obtain any make-up assignments.
2. Students are expected to come to class prepared by reading the assigned materials before class.
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take exams as scheduled.
5. Students are required to take a comprehensive final examination as scheduled.
6. Students will complete a research project to be discussed with and approved by instructor. (Please see attached document which outlines research project specifics and assignment due dates.)
7. Students will take quizzes based on assigned reading. Students are not allowed to make-up quizzes. (Quizzes will be a combination of multiple choice, short essay and matching)

**C. Required Textbook:**

**Entrepreneurial Finance**  
J. Chris Leach & Ronald W. Melicher  
Thomson/South-Western: ©2006  
ISBN: 0-324-28923-5

**D. Course Outline**

WEEK:	TOPICS, HOMEWORK, & EXAM ANNOUNCEMENTS:
WEEK #1	<ul style="list-style-type: none"><li><input type="checkbox"/> INTRODUCTION</li><li><input type="checkbox"/> COURSE OVERVIEW</li><li><input type="checkbox"/> SYLLABUS REVIEW/EXPECTATIONS/ASSIGNMENTS<ul style="list-style-type: none"><li>o HW: READ CHAPTER 1 (PAGES 3-29)</li><li>o HW: INTERNET ACTIVITIES #1 &amp; #2 (PAGE 32)</li><li>o HW: EXERCISES/PROBLEMS #1,2, AND 6 (PAGE 32)</li></ul></li></ul>
WEEK #2	<ul style="list-style-type: none"><li><input type="checkbox"/> ENTREPRENEURSHIP FUNDAMENTALS</li><li><input type="checkbox"/> SOURCES OF ENTREPRENEURIAL OPPORTUNITIES</li><li><input type="checkbox"/> THE INTERNET &amp; E-COMMERCE</li><li><input type="checkbox"/> PRINCIPLES OF ENTREPRENEURIAL FINANCE<ul style="list-style-type: none"><li>o HW: READ CHAPTER 1 APPENDIX (PAGES 36-39)</li><li>o HW: EXERCISES/PROBLEMS #7, 8, &amp; 9 (PAGE 33-34)</li><li>o HW: MINI-CASE: INTERACT SYSTEMS (PAGE 35)</li></ul></li></ul>

WEEK #3	<input type="checkbox"/> ROLE OF ENTREPRENEURIAL FINANCE <input type="checkbox"/> FINANCING A BUSINESS & THE VENTURE LIFE CYCLE <input type="checkbox"/> THE INTERNET ECONOMY & E-COMMERCE RESOURCES <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 2 (PAGES 39-61; 65-72)</li> <li>○ HW: INTERNET ACTIVITIES (ANY 2 ON PAGE 73)</li> <li>○ HW: EXERCISES/PROBLEMS #2, 3, 6 &amp; 7 (PAGES 74-76)</li> <li>○ HW: MINI-CASE: LEARNINGBEAM.COM (PGS 76-78)</li> </ul>
WEEK #4	<input type="checkbox"/> BUSINESS PLAN MODEL & FINANCES <input type="checkbox"/> LEARNING FROM ENTREPRENEURIAL “BEST PRACTICES” <input type="checkbox"/> KEY ELEMENTS OF A BUSINESS PLAN <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 3 (PAGES 82-111)</li> <li>○ HW: INTERNET ACTIVITIES (ANY 2 ON PAGE 112)</li> <li>○ HW: EXERCISES/PROBLEMS #1, 2, 3, 8 &amp; 9 (PAGES 112-114)</li> </ul>
WEEK #5	<input type="checkbox"/> FORMS OF BUSINESS ORGANIZATIONS <input type="checkbox"/> CHOOSING THE RIGHT FORM FOR YOUR VENTURE <input type="checkbox"/> INTELLECTUAL PROPERTY <input type="checkbox"/> SEED MONEY & START-UP FINANCING SOURCES <ul style="list-style-type: none"> <li>○ HW: EXERCISES/PROBLEMS #10 &amp; 11 (PAGES 114-115)</li> <li>○ HW: MINI-CASE: COOPERATIVE CONSTRUCTS PARTS A &amp; B (PGS 116-117)</li> </ul> <input type="checkbox"/> <b>EXAM #1</b>
WEEK #6	<input type="checkbox"/> BUSINESS ASSETS, LIABILITIES, AND OWNERS’ EQUITY <input type="checkbox"/> SALES, EXPENSES, & PROFITS <input type="checkbox"/> STATEMENT OF CASH FLOWS <input type="checkbox"/> BREAK-EVEN ANALYSES <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 4 (PAGES 118-140)</li> <li>○ HW: INTERNET ACTIVITIES (ANY 2 ON PAGE 141)</li> <li>○ HW: EXERCISES/PROBLEMS #1, 2, 3, 4, 5 &amp; 6 (PAGES 141-145)</li> <li>○ HW: MINI-CASE: BRANDIE’S MICRO-BATCH FROZEN YOGURT COMPANY (PGS 145-146)</li> </ul>
WEEK #7	<input type="checkbox"/> USING FINANCIAL RATIOS <input type="checkbox"/> CASH BURN RATES & LIQUIDITY RATIOS <input type="checkbox"/> CONVERSION PERIOD RATIOS <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 5 (PAGES 147-174)</li> <li>○ HW: DO INTERNET ACTIVITY #1 (PAGE 175)</li> </ul>
WEEK #8	<input type="checkbox"/> LEVERAGE RATIOS <input type="checkbox"/> PROFITABILITY RATIOS & EFFICIENCY RATIOS <input type="checkbox"/> INDUSTRY COMPARABLE RATIO ANALYSIS <input type="checkbox"/> FINANCIAL ANALYSIS <ul style="list-style-type: none"> <li>○ HW: EXERCISES/PROBLEMS #1 - #8 (PAGES 175-179)</li> <li>○ HW: MINI-CASE: SCANDI HOME FURNISHINGS, INC. (PAGES 179 – 182)</li> </ul> <input type="checkbox"/> <b>EXAM #2</b>

WEEK #9	<input type="checkbox"/> FINANCIAL PLANNING THROUGHOUT THE VENTURE'S LIFE CYCLE <input type="checkbox"/> SURVIVING THE SHORT RUN <input type="checkbox"/> SHORT-TERM CASH PLANNING TOOLS <input type="checkbox"/> PRO-FORMA (PROJECTED) MONTHLY FINANCIAL STATEMENTS <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 6 (PAGES 185 – 196)</li> <li>○ HW: INTERNET ACTIVITIES #1 &amp; #2 (PAGE 220)</li> </ul>
WEEK #10	<input type="checkbox"/> CASH PLANNING FROM A PRO-FORMA STATEMENT <input type="checkbox"/> FORECASTING SALES <input type="checkbox"/> ESTIMATING SUSTAINABLE SALES GROWTH RATES <input type="checkbox"/> ESTIMATING ADDITIONAL FINANCING NEEDED TO SUPPORT PROJECTED SALES GROWTH RATES <input type="checkbox"/> PERCENT-OF-SALES PROJECTED FINANCIAL STATEMENTS <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 6 (PAGES 196 – 218)</li> <li>○ HW: EXERCISES/PROBLEMS #1, 2, 5, 6, 7, 8 &amp; 9 (PAGES 220 – 223)</li> <li>○ HW: MINI-CASE: PHARMA BIOTECH PARTS A &amp; B (PAGES 223-225)</li> </ul>
WEEK #11	<input type="checkbox"/> IMPLICIT 7 EXPLICIT FINANCIAL CAPITAL COSTS (7.1) <input type="checkbox"/> FINANCIAL MARKETS (7.2) <input type="checkbox"/> REVIEW OF SOURCES OF VENTURE FINANCING (8.1) <input type="checkbox"/> COMMON STOCK (11.1) <input type="checkbox"/> HISTORY: PROFESSIONAL VENTURE CAPITAL (12.1) <ul style="list-style-type: none"> <li>○ HW: READ 7.1 &amp; 7.2 (PAGES 226-229); READ 8.1 (PAGES 260-261); READ 11.1 (PAGE 390); AND 12.1 (PAGES 425 – 430)</li> <li>○ HW: INTERNET ACTIVITIES #1 &amp; #2 (PAGE 446)</li> </ul>
WEEK #12	<input type="checkbox"/> FACILITATORS, CONSULTANTS, & INTERMEDIARIES <input type="checkbox"/> COMMERCIAL & VENTURE BANK LENDING <input type="checkbox"/> UNDERSTANDING WHY YOU MAY NOT GET DEBT FINANCING <input type="checkbox"/> CREDIT CARDS <ul style="list-style-type: none"> <li>○ HW: READ CHAPTER 13 (PAGES 449 – 455)</li> </ul> <input type="checkbox"/> EXAM #3
WEEK #13	<input type="checkbox"/> SMALL BUSINESS ADMINISTRATION PROGRAMS <ul style="list-style-type: none"> <li>○ GUEST SPEAKER (SBA)</li> <li>○ HW: READ CHAPTER 13 (PAGES 455 – 470)</li> <li>○ HW: INTERNET ACTIVITIES #1 &amp; #2</li> </ul>
WEEK #14	<input type="checkbox"/> OTHER GOVERNMENT FINANCING PROGRAMS <ul style="list-style-type: none"> <li>○ GUEST SPEAKER (CDC)</li> <li>○ HW: READ CHAPTER 13 (PAGES 470 - 482)</li> <li>○ HW: EXERCISES/PROBLEMS #1 &amp; #2</li> <li>○ HW: MINI-CASE: BRANDIE'S MICRO-BATCH YOGURT COMPANY (REVISITED) –PAGES 483 -484</li> </ul>
WEEK #15	<input type="checkbox"/> FINAL PROJECTS DUE

**D. Method of Evaluation**

Final grades for this course will be based on the following:

Exam(s):	300 points (each exam is worth 100 points)
Final Project:	200 points
Internet Activities:	60 points (Best 6 out of 8 assigned – 10 points each)
Exercises/Problems:	140 points (Best 7 out of 8 assigned – 20 points each)
Mini-Case Studies:	200 points (Best 5 out of 7 assigned – 40 points each)
Attendance/Participation	100 points
<b>TOTAL POINTS:</b>	<b>1000 points</b>

***Final course grade will be calculated as:***

950 and above	A	800-829:	B-	670-699:	D+
900-949:	A-	770-799:	C+	630-669:	D
870-899:	B+	730-769:	C	600-629:	D-
830-869:	B	700-729:	C-	Below 600:	F

***Final Research Project: 200 Points***

Each student will be required to complete a research project on small business financing. Students must document and/or complete the application process to obtain financing from the SBA, CDC, or other small business financing agencies in the Commonwealth of Massachusetts. In addition, students will be required to share research results in a 5-7 page presentation summarizing the main points of the project and describing the process used in obtaining financing.

Criteria for written presentation:

Format, structure, grammar:	20% of total points
Research/loan application/financials	70% of total points
Bibliography:	10 % of total points

### Assessment Plan

<b>WEEK</b>	<b>TOPIC</b>	<b>LEARNING OUTCOME</b>	<b>INSTRUCT/ METHODS</b>	<b>FACULTY RESOURCES</b>	<b>STUDENT RESOURCES</b>	<b>PRE - ASSESSMT</b>	<b>POST - ASSESSMT</b>
Week 2	Intro to Entrep. Finance	Learners will be able to define entrepreneurship; understand entrepreneurial finance; & compare and contrast business finance and personal finance.	Lecture Group Work Case Study	Textbook/ IM Website	Textbook Articles / Handouts / Web: <a href="http://leach.swlearning.com">http://leach.swlearning.com</a>	Informational Quiz	Exam #1
Week 3	Business Financial Life Cycle	Learners will be able to list and discuss the various stages of a venture's life cycle as well as the types of financing by life cycle stage; describe the primary components of a business plan; and gain knowledge of the main forms of business organization.	Lecture Group Discussion Case Study Video: "Bill Gates"	Textbook/ IM Website	Textbook Articles / Handouts	Discussion	Case Study Paper/ HW / Internet Activities  Exam #1
Week 4	Intellectual Property	Learners will articulate the use of patents, trademarks, and copyrights. Learners will also be able to identify how to use financial bootstrapping and the use of business angles.	Lecture Group Discussion Case Study	Textbook/ IM Website	Textbook Articles / Handouts	Informational Quiz	Exam #1
Week 5	Financial Statements	Learners will be able to understand & prepare the basic financial statements (balance sheet, income statement, and cash flows).	Lecture Discussion Case Study Video: "Colonel Sanders"	Textbook/ IM Website	Textbook Articles / Handouts on Financial Statements.	Accounting I Reading	Exam #2  Final Project

Week 6	Measure Financial Performance	Learners will articulate uses of financial statements for analysis purposes; perform a breakeven analysis.	Lecture Group Work Case Study	Textbook/ IM Website	Textbook Articles / Handouts	Discussion	Exam #2  Final Project
Weeks 7 & 8	Ratio Analysis	Learners will use financial ratios to determine the financial strengths & weaknesses of a business venture.	Lecture Group Work Case Study Video: "Steve Rubell"	Textbook/ IM Website	Textbook Articles / Handouts	Informational Quiz	Exam #2  Final Project
Week 9	Short Run	Learners articulate an understanding of the short run cash management challenges that entrepreneurs face & prepare pro-forma financial statements.	Lecture Group Work Case Study	Textbook/ IM Website	Textbook Articles / Handouts	Informational Quiz	Exam #2  Final Project
Week 10	Sales Growth Forecasts	Learners will understand sales forecasting, prepare forecasts, and determine cash needs for the near future based on those sales forecasts.	Lecture Group Work Case Study	Textbook/ IM Website	Textbook Articles / Handouts	Discussion	Exam #3  Final Project
Week 11	Financial Markets & Venture Capital	Learners will appreciate some basic knowledge of how the financial markets allow businesses to raise money, and how small businesses utilize them as the venture matures.	Lecture Discussion Video	Textbook/ IM Websites:	Textbook Articles / Handouts	Informational Quiz	Exam #3  Final Project
Week 12	Bank Lending	Learners will describe how bank lending practices affect small businesses; as	Lecture Guest Speaker	Textbook/ IM Websites:	Textbook Articles / Handouts	Discussion	Final Project

		well as how some entrepreneurs started their business with credit cards.					
Week 13	SBA programs	Learners will understand the process of obtaining funding from the programs sponsored by the SBA (Small Business Administration).	Lecture Guest Speaker	Textbook/ IM Websites:	Textbook Articles / Handouts	Informational Quiz Discussion	Final Project
Week 14	Other Gov't Programs for Small Business	Learners will understand the process of obtaining funding from the programs sponsored by the Commonwealth of Massachusetts as well as local CDCs.	Lecture Guest Speaker	Textbook/ IM Websites:	Textbook Articles / Handouts	Informational Quiz Discussion	Final Project

DRAFT

**QUINSIGAMOND COMMUNITY COLLEGE  
COURSE APPROVAL/REVISION  
CURRICULUM APPROVAL/REVISION  
PROGRAM REVISION  
ACTION FORM**

1. Course/Program Title: SCI 107 Science of Technology: Vision and Light

2. Originator: Andria Schwartz Date: 9/19/08

3. Academic Unit Dean: Nancy Schoenfeld Date: 9/19/08

**Recommendation:** The Human Services and Science Division recommends approval of the course SCI 107 Science of Technology: Vision and Light at the 9/18/08 Division meeting.

**Rationale:** Rationale: As a result of increased enrollment in science courses and at the college in general it has been necessary to provide more offerings of lab science electives. Additionally, the courses are part of the Power Up initiative to strengthen and expand the engineering and technical program quality and recruitment at the college.

4. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

Academic Affairs Staff: \_\_\_\_\_ Date: \_\_\_\_\_  
Comments:

5. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

VP/Academic Affairs: \_\_\_\_\_ Date: \_\_\_\_\_  
Comments:

6. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

Academic Affairs Committee \_\_\_\_\_ Date: \_\_\_\_\_  
Comments:

7. Approved: \_\_\_\_\_ Not Approved: \_\_\_\_\_

VP/Academic Affairs: \_\_\_\_\_ Date: \_\_\_\_\_  
Comments:

Quinsigamond Community College

Request For A New Course Or Course Revision

Course Discipline Department of Natural Sciences Division Human Services and Science

Date May 22, 2008

Course Title Science of Technology: Vision and Light

Course Number SCI 107

Lecture Hours 3 Credits 4 Clinic Hrs \_\_\_\_\_ Lab Hrs 3

Prerequisite MAT 095, ENG 100 Corequisite \_\_\_\_\_

Application As Elective? Fulfills lab science requirement

Course Effective Term Spring Semester Year 2009

2) Does This Course Replace Another Course? No

Which Course? \_\_\_\_\_

If Revision, Rationale For Revision Should Be Given Here:

3) Is Course Content Similar To Other Courses Now Offered? No

If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

10) For Whom Is This Course Designed? Any program that requires a lab science elective

11) Required Course? no Required For

12) Expected Enrollment Per Term 24 Per Year 24 in first year – more sections added as needed

13) Additional Staff? No Number Of Additional Staff \_\_\_\_\_

14) Additional Space? No Amount Of Additional Space \_\_\_\_\_

15) Additional Equipment? Yes Additional Cost \$2,000

16) Additional LRC Materials? Yes Estimated Cost \$500

17) Signature: \_\_\_\_\_ (Library Services Director)

12) Text And Related Materials see attachment

13) Attach Course Description And Outline To This Page

**SCI 107: Science of Technology: Vision and Light 4 credits****Course Description:**

This course provides an introduction to the way that science studies light and vision. This course has a particular emphasis on innovations that correct vision and allow humans to extend a person's natural ability to visually explore the world and exchange ideas. Students learn scientific principles that underlie many technological devices that enhance human ability, as well as the complimentary roles of the Scientific Method and the Engineering Design Process. Students gain an understanding of methodologies used in scientific investigations through the laboratory portion of the course.

Prerequisite: MAT 095 or appropriate placement score; ENG 100 or appropriate placement score

**Required Texts and Supplies:**

Bloomfield, Louis A. *How Things Work: The Physics of Everyday Life*, 3rd Edition is the required text for this course. ISBN: 978-0-471-46886-8.

A four-function or scientific calculator is required.

**Teaching Procedures:**

This course will be taught through a variety of methods. Course content will be focused around scientific themes in current events. Lecture and instructor-guided discussion will communicate content; group work and student-led discussion will be used to help students practice the ideas they learn and exercise their reasoning skills. Readings and assignments from the text and additional sources will reinforce content introduced in class and help students hone their thought process and problem solving skills. Labs will allow students to practice and explore what they have learned in a hands-on setting.

**Syllabus**

See attached.

**List of Instructor Resources**

Bloomfield, Louis A. *How Things Work: The Physics of Everyday Life*, 3rd Edition. ISBN: 978-0-471-46886-8. How Stuff Works. <http://www.howstuffworks.com/>. Copyright 2008.

Lab handouts

<b>Course Information</b>	<p>Science of Technology: Vision and Light                  SCI 107-01                  Fall 2008</p> <p>Lecture: TBA                  Lab: TBA                  Final: TBA</p>
<b>Instructor Information</b>	TBA
<b>Emergency Information</b>	<p>Campus Closings                  (508) 854-4545  <a href="http://www.qcc.mass.edu/inclementweather/">http://www.qcc.mass.edu/inclementweather/</a></p> <p>Campus Police                  (508) 854-4444</p>
<b>Course Description</b>	<p>SCI 107 Science of Technology: Vision and Light - 4 credits</p> <p>This course provides an introduction to the way that science studies light and vision. This course has a particular emphasis on innovations that correct vision and allow humans to extend a person's natural ability to visually explore the world and exchange ideas. Students learn scientific principles that underlie many technological devices that enhance human ability, as well as the complimentary roles of the Scientific Method and the Engineering Design Process. Students gain an understanding of methodologies used in scientific investigations through the laboratory portion of the course.</p> <p>Prerequisite: MAT 095 or appropriate placement score; ENG 100 or appropriate placement score</p>
<b>Required Texts and Supplies</b>	<p>Bloomfield, Louis A, <u>How Things Work: The Physics of Everyday Life</u>, 3rd Edition is the required text for this course. ISBN: 978-0-471-46886-8. (\$80.95 online)</p> <p>A four-function (\$1-\$4) or scientific calculator (\$10-\$40) such as the TI-30Xa scientific calculator; calculators that can solve formulae analytically (algebraically) such as the TI-89 or TI-92 <b>are NOT permitted</b>. Graphing calculators may be used during exams <b>ONLY</b> if you can demonstrate erasing its memory. Cell phones may <b>NOT</b> be used as calculators. Bring your calculator to class daily.</p> <p>Lab supplies: graph paper, metric ruler, compass, protractor, pencil, colored pens or pencils. These will not be supplied, but may be shared with classmates.</p>
<b>Instructional Objectives and Goals</b>	<ul style="list-style-type: none"> <li>• Demonstrate parallels between Scientific Method and Engineering Design Process</li> <li>• Explore the impact of science and technology on society and each other and the complimenting viewpoints of scientists and technologists</li> <li>• Explain how the Scientific Method is used to make discoveries about the natural world, and how the Engineering Design Process takes discoveries and uses them to improve society.</li> <li>• Learn the common language of scientists and technologists.</li> <li>• Understand that "science words" are tools.</li> <li>• Understand science and technology in the media.</li> <li>• Be able to explain common ideas in science and technology in everyday words.</li> <li>• Be able to present information learned in well-organized original research reports.</li> <li>• Develop critical thinking skills.</li> </ul>

**Teaching  
Procedures**

This course will be taught through a variety of methods. Course content will be focused around scientific themes in current events. Lecture and instructor-guided discussion will communicate content; group work and student-led discussion will be used to help students practice the ideas they learn and exercise their reasoning skills. Readings and assignments from the text and additional sources will reinforce content introduced in class and help students hone their thought process and problem solving skills. Labs will allow students to practice and explore what they have learned in a hands-on setting.

**Student Expectations**

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Students are expected to seek extra help from the course instructor as needed – professors appreciate it when students make the extra effort and ask for assistance or clarification.

Although this is a lab science course, it does not exist in isolation from the rest of your education: you will need to use math skills, give written descriptions, and be able to accurately draw and interpret diagrams. Expect to spend three hours studying for every hour spent in class or lab. Forming a study group to work on homework assignments together is recommended.

**Attendance**

Students are responsible for all material covered during class time, and attendance will be taken. Should you miss a class, you can get the notes from a classmate or the instructor. Homework assignments and quizzes will be announced in class, and you are responsible for any changes in exam dates or times announced in class. As attendance, class participation, and quizzes together make up 35% of your grade, it can significantly help you to attend class on a daily basis. Most students find that classroom time spent in lecture, discussion, and group work are invaluable in learning the material and cannot be adequately replaced by self-study.

Students who add the course during Add/Drop period are still responsible for the material missed in lecture and must make up any missed labs, though absences will be counted as excused.

Arriving late to class or leaving early will count as an absence.

**Excused Absences  
and Make-Up  
Exams**

Make-up exams may be scheduled, quizzes and graded classwork may be made up, absences may be excused, and other assignments have their due dates extended if either (a) the student informs the instructor ONE WEEK BEFORE the event, or (b) a student with a medical or family emergency contacts the instructor within one week after the event and PROVIDES EVIDENCE (such as a tow truck receipt, jail discharge note, doctor's note, death certificate, obituary, or notification from the Dean of Students). If you inform the instructor at least one week ahead of time, you need not give a reason – religious observances, child care, or going on vacation are equally acceptable if you talk to the instructor ahead of time.

**Special Needs**

Students with special needs may provide the instructor with an accommodation sheet from Disabilities Services. As per Quinsig policy, the instructor will make necessary accommodations as indicated on the sheet for all assignments written after that date.

The Disability Services Office is located on in room 246-A, 508-854-4471, [disabilityservices@qcc.mass.edu](mailto:disabilityservices@qcc.mass.edu) .

## Plagiarism

The official QCC definition of plagiarism may be found in the student handbook.

Plagiarism includes copying on a test or otherwise turning in work that is not your own. Examples range from “mild” and likely accidental cases (such as answering homework questions by copying directly from the textbook or using pictures from the internet without credit), to clearly intentional acts of cheating (such as copying test answers from a classmate or buying essays online).

Plagiarism or cheating on an assignment or exam will result in a **zero on that assignment** for all individuals involved – if you let someone else copy your work, you will receive a zero too. A second incidence will result in a **grade of F** for the class, and both the Dean of Students and of the specific course will be informed, potentially leading to **permanent dismissal from the college**.

## Cell Phone Use

Cell phones, pagers, walkie-talkies, and other communication devices should be turned off or in silent or vibrate mode at all times during class. A cell phone going off will result in a pop quiz. Text messaging will result in a zero for that day’s attendance and class participation grade. If you are expecting an important call, are on call for your job, or are the primary caregiver for a child in childcare, please inform the instructor at the beginning of class and you may answer the call outside the classroom.

Cell phone use is strictly PROHIBITED during exams. Any use of a cell phone during an exam will be considered cheating and will result in an automatic zero on that exam and be dealt with as per the plagiarism policy, above. Cell phones may NOT be used as calculators in class or on exams.

## Grading Policy

Student understanding will be gained and assessed through multiple methods: class work, labs, quizzes, a final project, and two exams. This will be a lot of work, but if you start off on the right foot and keep up with things, you will find the work greatly enhances your understanding of difficult topics. Individual assignments, exams, or overall grades are not curved, and should extra credit be necessary it will be offered to the whole class.

### Class work and Attendance 10%

Graded in-class activities also provide opportunity for students to practice their knowledge as they are learning. Graded activities will typically consist of group work, and will take place during class time once or twice a week, with no prior notice. Class participation is required and will be assessed through these activities and attendance taken periodically at the beginning of class. Arrival to class after attendance is taken or leaving class early will count as an absence.

### Quizzes 10%

Quizzes will take place approximately weekly (10-15 quizzes total throughout the semester). They will be around 15-20 minutes in length, consisting of 1-3 short essay questions, will take place at the end of a normal class session, and will be announced in the previous class session. They will be open book/notes, and one or two questions per quiz will come **directly** from the homework or class discussion. Solutions to numerical problems **must** show formulas used and all the steps you take to get to the answer in order to receive full credit.

Missed quizzes cannot be made up, however ONE missed quiz will be dropped; if you

have not missed any quizzes, you will be able to earn extra credit. Readings, questions from the textbook, and handouts will be given out approximately weekly and will be reviewed in class on request, but will NOT be collected or graded. However, weekly quizzes will be based upon homework assignments. In addition, most students find that homework assigned throughout the semester helps their overall understanding of the material, and is a good practice for exams. Homework is NOT directly part of your grade, but is the basis of quizzes and exams.

**Final Project**  
**20%**

The final project for this class will involve research and a presentation upon a science/technology concept and the scientist or technologist behind it. This work will be performed in pairs, with each individual responsible for half of the work. Each individual will hand in a paper and the group will present their work jointly as a PowerPoint presentation during a lab period.

**Labs**  
**30%**

As this is a lab course, labs are performed every week, and lab reports are turned in individually one week after they are performed. Late work will lose 10% for every day late (regardless of whether class is held or campus is open on that day), and will no longer be accepted after a week has passed. Turning in a lab report for a lab you did not attend will be treated as copying the lab (see plagiarism, above). **You MUST pass the lab component of this course to pass the course overall.**

If you add the course during Add/Drop period but after a lab has already been performed, you MUST make up the lab or it will count as a zero. Your first missed lab will be dropped; subsequent labs must be made up during another lab period or will receive a zero. If you have not missed any labs, you will be able to earn extra credit.

**Exams**  
**30%**

There will be two exams throughout the semester: one during the normal course of classes, and one two-hour cumulative final during finals week. Each will consist of both multiple choice and long-answer (essay) questions, drawn from the textbook, quizzes, class, and other sources.

**Grades**

Below is the QCC rubric for determining how numerical averages will be assigned letter grades.

95-100	A
90-94	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
66-63	D
60-62	D-
0-59	F

**Topics**

A preliminary list of topics to be covered in this course and deadlines is below. Topics, assignments, and their dates and order may change at instructor discretion.

Labs may take place 1-2 weeks after their material is covered in lecture.

Week	Topic	Text Reading	Lab
1	9/5-9/11	Scientific Method and the Engineering Design Process	Lab Contracts, "Special Project"
2	9/12-9/16	Human eye, perception of light	Scientific Notation and Significant Figures
3	9/17-9/23	Light and color (how light behaves)	Prisms and color
4	9/24-9/30	Optics and glasses	Refraction and Snell's Law
5	10/1-10/7	Telescopes and microscopes	Telescopes and Magnification
6	10/8-10/14	Camera	Pinhole Camera, Sunspotter
7	10/15-10/21	Film and digital cameras	Color and B&W photography
8	10/22-10/28	Light revisited – light bulbs and flashlights (how light is created)	Spectral Lines
9	10/29-11/4	Batteries	Simple Circuits
10	11/5-11/11	Solar cells	Solar energy
11	11/12-11/18	Light our eyes can't see – Remote control	Photovoltaic Cells
12	11/19-11/25	Radio waves and Doppler effect	Infrared communication devices
13	11/26-12/2	Radar guns and radar detectors	TBA
14	TBA	Lasers and DVD players	TBA
15	TBA	Review for Final	TBA

## SCI 107 – Student Learning Outcomes

### Skills Outcomes

- Appreciation and understanding of the interdependence of the scientific study of light and the development of technologies to improve quality of life.
- Information literacy – determine the validity of sources (especially internet sources), distinguish between peer-reviewed journal articles and press releases (i.e., newspapers), understand contemporary news articles on the subjects of light, vision, optics, and communication.
- Teamwork – work within a team to gather and analyze data, collaborate with peers to produce a finished product.
- Lab techniques/use of tools – knowledge of tools appropriate for the assignment proper care of and respect for tools, observational skills, computer data collection and analysis software.
  - Examples of tools: simple circuits, voltmeters, diffraction gratings, and emission tubes
- Critical thinking skills – analyzing evidence; evaluate how to improve process of data collection; drawing conclusions from data, observations, or experimental results. Interpret models including graphs, formulae, tables, and schematics and draw inferences from them, point out the strengths and weaknesses of specific models, compare and contrast competing models, understand how models have changed over time, develop a sense of inquiry.
- Communication skills – explain concepts to peers verbally or through posters, diagrams, write descriptions, communicate findings, analyses and interpretations both orally and in writing.
- Knowledge of major issues and problems facing contemporary scientists and technologists including issues that touch upon ethics, values, public policies, and funding.

## Content Outcomes

### Science

- Explain the properties of waves such as frequency, energy, wavelength, color and brightness.
- Describe how light behaves (i.e. reflection, refraction, diffraction and Doppler effect).
- Identify and explain the steps of the Scientific Method.
- Understand that the Scientific Method is used to answer questions about the natural world.
- Differentiate between direct experimentation, observation, and theory.
- Understand the distinction between quantitative and qualitative measurements.
- Understand the scope of science, including what are valid subjects of study, the limitations of science, falsifiability, and uncertainty.
- Understand the role of computer models and simulations.
- Be able to use and apply SI, metric units and scientific notation.
- Understand that scientific knowledge has evolved over time.
- Differentiate among conduction, convection, and radiation in a thermal system (e.g., heating and cooling a house, cooking).
- Understand how energy comes in different forms and can change forms (i.e. electricity, solar energy, waves, batteries).

### Technology

- Understand that the engineering design process is used in the solution of problems and the advancement of society.
- Identify and explain the steps of the engineering design process, i.e. identify the problem.
- Identify examples of technologies, objects, and processes that have been modified to advance society, and explain why and how they were modified.
- Interpret plans, diagrams, and working drawings in the construction of prototypes or models.
- Identify and explain the engineering properties of materials used.
- Differentiate among conduction, convection, and radiation in a thermal system (e.g., heating and cooling a house, cooking).
- Identify and explain renewable energy sources (e.g., wind and solar energy conversion systems).
- Explain how information travels through the following media: electrical wire, optical fiber, air, and space.
- Differentiate between digital and analog signals and describe how communication devices employ both digital and analog technologies (e.g., computers, cell phones).
- Explain how the various components (source, encoder, transmitter, receiver, decoder, destination, storage, and retrieval) and processes of a communication system function.
- Understand the relationships among voltage, current, and resistance in a simple circuit, using Ohm's law.

**QUINSIGAMOND COMMUNITY COLLEGE**  
**COURSE APPROVAL/REVISION**  
**CURRICULUM APPROVAL/REVISION**  
**PROGRAM REVISION**  
**ACTION FORM**

1. Course/Program Title: SCI 108 Science of Technology: Hearing and Sound

2. Originator: Andria Schwartz

Date: 9/19/08

3. Academic Unit Dean: Nancy Schoenfeld

Date: 9/19/08

**Recommendation:** The Human Services and Science Division recommends approval of the course SCI 108 Science of Technology: Hearing and Sound at the 9/18/08 Division meeting.

**Rationale:** As a result of increased enrollment in science courses and at the college in general it has been necessary to provide more offerings of lab science electives. Additionally, the courses are part of the Power Up initiative to strengthen and expand the engineering and technical program quality and recruitment at the college.

4. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

Academic Affairs Staff: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

5. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

VP/Academic Affairs: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

6. Recommended: \_\_\_\_\_ Not Recommended: \_\_\_\_\_

Academic Affairs Committee \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

7. Approved: \_\_\_\_\_ Not Approved: \_\_\_\_\_

VP/Academic Affairs: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

Quinsigamond Community College

Request For A New Course Or Course Revision

Course Discipline Department of Natural Sciences Division Human Services and Science

Date May 22, 2008

Course Title Science of Technology: Hearing and Sound

Course Number SCI 108

Lecture Hours 3 Credits 4 Clinic Hrs \_\_\_\_\_ Lab Hrs 3

Prerequisite MAT 095, ENG 100 Corequisite \_\_\_\_\_

Application As Elective? Fulfills lab science requirement

Course Effective Term Spring Semester Year 2009

3) Does This Course Replace Another Course? No

Which Course? \_\_\_\_\_

If Revision, Rationale For Revision Should Be Given Here:

4) Is Course Content Similar To Other Courses Now Offered? No  
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

18) For Whom Is This Course Designed? Any program that requires a lab science elective

19) Required Course? no Required For

20) Expected Enrollment Per Term 24 Per Year 24 in first year – more sections added as needed

21) Additional Staff? No Number Of Additional Staff \_\_\_\_\_

22) Additional Space? No Amount Of Additional Space \_\_\_\_\_

23) Additional Equipment? Yes Additional Cost \$2,000

24) Additional LRC Materials? Yes Estimated Cost \$500

25) Signature: \_\_\_\_\_ (Library Services Director)

14) Text And Related Materials see attachment

15) Attach Course Description And Outline To This Page

## **SCI 108: Science of Technology: Hearing and Sound 4 credits**

### **Course Description:**

This course provides an introduction to the way that science studies sound and hearing. This course has a particular emphasis on innovations that correct hearing and allow humans to extend a person's natural ability to explore the world and exchange ideas through sound. Students learn scientific principles that underlie many technological devices that enhance human ability, as well as the complimentary roles of the Scientific Method and the Engineering Design Process. Students gain an understanding of methodologies used in scientific investigations through the laboratory portion of the course.

Prerequisite: MAT 095 or appropriate placement score; ENG 100 or appropriate placement score

### **Required Texts and Supplies:**

Bloomfield, Louis A, *How Things Work: The Physics of Everyday Life*, 3rd Edition is the required text for this course. ISBN: 978-0-471-46886-8.

A four-function or scientific calculator is required.

### **Teaching Procedures:**

This course will be taught through a variety of methods. Course content will be focused around scientific themes in current events. Lecture and instructor-guided discussion will communicate content; group work and student-led discussion will be used to help students practice the ideas they learn and exercise their reasoning skills. Readings and assignments from the text and additional sources will reinforce content introduced in class and help students hone their thought process and problem solving skills. Labs will allow students to practice and explore what they have learned in a hands-on setting.

### **Syllabus**

See attached.

### **List of Instructor Resources**

Bloomfield, Louis A. *How Things Work: The Physics of Everyday Life*, 3rd Edition. ISBN: 978-0-471-46886-8.

*How Stuff Works*. <http://www.howstuffworks.com/>. Copyright 2008.

Lab handouts

<b>Course Information</b>	<p>Science of Technology: Hearing and Sound          SCI 108-01          Spring 2009</p> <p>Lecture: TBA          Lab: TBA          Final: TBA</p>
<b>Instructor Information</b>	TBA
<b>Emergency Information</b>	<p>Campus Closings          (508) 854-4545  <a href="http://www.qcc.mass.edu/inclementweather/">http://www.qcc.mass.edu/inclementweather/</a></p> <p>Campus Police          (508) 854-4444</p>
<b>Course Description</b>	<p>SCI 108 Science of Technology: Hearing and Sound - 4 credits</p> <p>This course provides an introduction to the way that science studies sound and hearing. This course has a particular emphasis on innovations that correct hearing and allow humans to extend a person's natural ability to explore the world and exchange ideas through sound. Students learn scientific principles that underlie many technological devices that enhance human ability, as well as the complimentary roles of the Scientific Method and the Engineering Design Process. Students gain an understanding of methodologies used in scientific investigations through the laboratory portion of the course.</p> <p>Prerequisite: MAT 095 or appropriate placement score; ENG 100 or appropriate placement score</p>
<b>Required Texts and Supplies</b>	<p>Bloomfield, Louis A, <u>How Things Work: The Physics of Everyday Life</u>, 3rd Edition is the required text for this course. ISBN: 978-0-471-46886-8. (\$80.95 online)</p> <p>A four-function (\$1-\$4) or scientific calculator (\$10-\$40) such as the TI-30Xa scientific calculator; calculators that can solve formulae analytically (algebraically) such as the TI-89 or TI-92 <b>are NOT permitted</b>. Graphing calculators may be used during exams ONLY if you can demonstrate erasing its memory. Cell phones may NOT be used as calculators. Bring your calculator to class daily.</p> <p>Lab supplies: graph paper, metric ruler, compass, protractor, pencil, colored pens or pencils. These will not be supplied, but may be shared with classmates.</p>
<b>Instructional Objectives and Goals</b>	<ul style="list-style-type: none"> <li>• Demonstrate parallels between Scientific Method and Engineering Design Process</li> <li>• Explore the impact of science and technology on society and each other and the complimenting viewpoints of scientists and technologists</li> <li>• Explain how the Scientific Method is used to make discoveries about the natural world, and how the Engineering Design Process takes discoveries and uses them to improve society.</li> <li>• Learn the common language of scientists and technologists.</li> <li>• Understand that "science words" are tools.</li> <li>• Understand science and technology in the media.</li> <li>• Be able to explain common ideas in science and technology in everyday words.</li> <li>• Be able to present information learned in well-organized original research reports.</li> <li>• Develop critical thinking skills.</li> </ul>
<b>Teaching Procedures</b>	<p>This course will be taught through a variety of methods. Course content will be focused around scientific themes in current events. Lecture and instructor-guided discussion will communicate content; group work and student-led discussion will be used to help students practice the ideas they learn and exercise their reasoning skills. Readings and assignments from the text and additional sources will reinforce content introduced in class and help students hone their thought</p>

process and problem solving skills. Labs will allow students to practice and explore what they have learned in a hands-on setting.

## Student Expectations

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Students are expected to seek extra help from the course instructor as needed – professors appreciate it when students make the extra effort and ask for assistance or clarification.

Although this is a lab science course, it does not exist in isolation from the rest of your education: you will need to use math skills, give written descriptions, and be able to accurately draw and interpret diagrams. Expect to spend three hours studying for every hour spent in class or lab. Forming a study group to work on homework assignments together is recommended.

### Attendance

Students are responsible for all material covered during class time, and attendance will be taken.

Should you miss a class, you can get the notes from a classmate or the instructor. Homework assignments and quizzes will be announced in class, and you are responsible for any changes in exam dates or times announced in class. As attendance, class participation, and quizzes together make up 35% of your grade, it can significantly help you to attend class on a daily basis. Most students find that classroom time spent in lecture, discussion, and group work are invaluable in learning the material and cannot be adequately replaced by self-study.

Students who add the course during Add/Drop period are still responsible for the material missed in lecture and must make up any missed labs, though absences will be counted as excused. Arriving late to class or leaving early will count as an absence.

### Excused Absences and Make-Up Exams

Make-up exams may be scheduled, quizzes and graded classwork may be made up, absences may be excused, and other assignments have their due dates extended if either (a) the student informs the instructor ONE WEEK BEFORE the event, or (b) a student with a medical or family emergency contacts the instructor within one week after the event and PROVIDES EVIDENCE (such as a tow truck receipt, jail discharge note, doctor's note, death certificate, obituary, or notification from the Dean of Students). If you inform the instructor at least one week ahead of time, you need not give a reason – religious observances, child care, or going on vacation are equally acceptable if you talk to the instructor ahead of time.

### Special Needs

Students with special needs may provide the instructor with an accommodation sheet from Disabilities Services. As per Quinsig policy, the instructor will make necessary accommodations as indicated on the sheet for all assignments written after that date.

The Disability Services Office is located on in room 246-A, 508-854-4471, [disabilityservices@qcc.mass.edu](mailto:disabilityservices@qcc.mass.edu).

### Plagiarism

The official QCC definition of plagiarism may be found in the student handbook. Plagiarism includes copying on a test or otherwise turning in work that is not your own. Examples range from “mild” and likely accidental cases (such as answering homework questions by copying directly from the textbook or using pictures from the internet without credit), to clearly intentional acts of cheating (such as copying test answers from a classmate or buying essays online).

Plagiarism or cheating on an assignment or exam will result in a **zero on that assignment** for all individuals involved – if you let someone else copy your work, you will receive a zero too. A second incidence will result in a **grade of F** for the class, and both the Dean of Students and of the specific course will be informed, potentially leading to **permanent dismissal from the college**.

**Cell Phone Use** Cell phones, pagers, walkie-talkies, and other communication devices should be turned off or in silent or vibrate mode at all times during class. A cell phone going off will result in a pop quiz. Text messaging will result in a zero for that day's attendance and class participation grade. If you are expecting an important call, are on call for your job, or are the primary caregiver for a child in childcare, please inform the instructor at the beginning of class and you may answer the call outside the classroom.

Cell phone use is strictly PROHIBITED during exams. Any use of a cell phone during an exam will be considered cheating and will result in an automatic zero on that exam and be dealt with as per the plagiarism policy, above. Cell phones may NOT be used as calculators in class or on exams.

## **Grading Policy**

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Student understanding will be gained and assessed through multiple methods: class work, labs, quizzes, a final project, and two exams. This will be a lot of work, but if you start off on the right foot and keep up with things, you will find the work greatly enhances your understanding of difficult topics. Individual assignments, exams, or overall grades are not curved, and should extra credit be necessary it will be offered to the whole class.

**Class work and Attendance 10%** Graded in-class activities also provide opportunity for students to practice their knowledge as they are learning. Graded activities will typically consist of group work, and will take place during class time once or twice a week, with no prior notice. Class participation is required and will be assessed through these activities and attendance taken periodically at the beginning of class. Arrival to class after attendance is taken or leaving class early will count as an absence.

**Quizzes 10%** Quizzes will take place approximately weekly (10-15 quizzes total throughout the semester). They will be around 15-20 minutes in length, consisting of 1-3 short essay questions, will take place at the end of a normal class session, and will be announced in the previous class session. They will be open book/notes, and one or two questions per quiz will come **directly** from the homework or class discussion. Solutions to numerical problems **must** show formulas used and all the steps you take to get to the answer in order to receive full credit.

Missed quizzes cannot be made up, however ONE missed quiz will be dropped; if you have not missed any quizzes, you will be able to earn extra credit.

Readings, questions from the textbook, and handouts will be given out approximately weekly and will be reviewed in class on request, but will NOT be collected or graded. However, weekly quizzes will be based upon homework assignments. In addition, most students find that homework assigned throughout the semester helps their overall understanding of the material, and is a good practice for exams.

Homework is NOT directly part of your grade, but is the basis of quizzes and exams.

**Final Project 20%** The final project for this class will involve research and a presentation upon a science/technology concept and the scientist or technologist behind it. This work will be performed in pairs, with each individual responsible for half of the work. Each individual will hand in a paper and the group will present their work jointly as a PowerPoint presentation during a lab period.

**Labs 30%** As this is a lab course, labs are performed every week, and lab reports are turned in individually one week after they are performed. Late work will lose 10% for every day late (regardless of whether class is held or campus is open on that day), and will no longer be accepted after a week has passed. Turning in a lab report for a lab you did not attend will be treated as copying the lab (see plagiarism, above). **You MUST pass the lab component of this course to pass the course overall.**

If you add the course during Add/Drop period but after a lab has already been performed, you **MUST** make up the lab or it will count as a zero. Your first missed lab will be dropped; subsequent labs must be made up during another lab period or

will receive a zero. If you have not missed any labs, you will be able to earn extra credit.

**Exams  
30%**

There will be two exams throughout the semester: one during the normal course of classes, and one two-hour cumulative final during finals week. Each will consist of both multiple choice and long-answer (essay) questions, drawn from the textbook, quizzes, class, and other sources.

**Grades**

Below is the QCC rubric for determining how numerical averages will be assigned letter grades.

95-100	A
90-94	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
66-63	D
60-62	D-
0-59	F

**Topics**

A preliminary list of topics to be covered in this course and deadlines is below. Topics, assignments, and their dates and order may change at instructor discretion.

Labs may take place 1-2 weeks after their material is covered in lecture.

Week	Topic	Text Reading	Lab
1	1/19-1/25	Scientific Method and the Engineering Design Process	Lab Contracts, "Special Project"
2	1/26-2/1	Human ear, perception of sound, balance and motion	Scientific Notation and Significant Figures
3	2/2-2/8	Sound waves, Doppler effect, noise cancellation	Standing waves on a string
4	2/9-2/16	Musical instruments	Standing waves in a tube
5	2/17-2/22	AC current	AC current
6	2/23-3/1	Speakers – electromagnet, Lenz's Law	Lenz's Law
7	3/2-3/8	Microphones	Transducers
8	3/9-3/15	Hearing aids	Speed of sound
9	3/23-3/29	Phonograph	Tuning fork, cup and string phones
10	3/30-4/5	Radio – AM/FM	Build a radio (kit)
11	4/6-4/12	Tape recordings	Magnetic fields
12	4/13-4/19	Cellphone, amplifiers	Wave Demonstrations
13	4/20-4/26	TBA	TBA
14	4/27-5/3	Digital sound – CDs, mp3s, compression	TBA
15	TBA	Review for Final	TBA

**SCI 108 – Student Learning Outcomes**

## Skills Outcomes

- Appreciation and understanding of the interdependence of the scientific study of sound and the development of technologies to improve quality of life.
- Information literacy – determine the validity of sources (especially internet sources), distinguish between peer-reviewed journal articles and press releases (i.e., newspapers), understand contemporary news articles on the subjects of sound, hearing, medical imaging, and communication.
- Teamwork – work within a team to gather and analyze data, collaborate with peers to produce a finished product.
- Lab techniques/use of tools – knowledge of tools appropriate for the assignment, proper care of and respect for tools, observational skills, computer data collection and analysis software.
  - Examples of tools: including wave tanks, string vibrators, and electromagnets
- Critical thinking skills – analyzing evidence; evaluate how to improve process of data collection; drawing conclusions from data, observations, or experimental results. Interpret models including graphs, formulae, tables, and schematics and draw inferences from them, point out the strengths and weaknesses of specific models, compare and contrast competing models, understand how models have changed over time, develop a sense of inquiry.
- Communication skills – explain concepts to peers verbally or through posters, diagrams, write descriptions, communicate findings, analyses and interpretations both orally and in writing.
- Knowledge of major issues and problems facing contemporary scientists and technologists including issues that touch upon ethics, values, public policies, and funding.

## Content Outcomes

### Science

- Explain the properties of waves such as frequency, energy, wavelength, pitch and volume.
- Describe how sound behaves (i.e. diffraction and Doppler effect).
- Identify and explain the steps of the Scientific Method.
- Understand that the Scientific Method is used to answer questions about the natural world.
- Differentiate between direct experimentation, observation, and theory.
- Understand the distinction between quantitative and qualitative measurements.
- Understand the scope of science, including what are valid subjects of study, the limitations of science, falsifiability, and uncertainty.
- Understand the role of computer models and simulations.
- Be able to use and apply SI, metric units and scientific notation.
- Understand that scientific knowledge has evolved over time.
- Differentiate among conduction, convection, and radiation in a thermal system (e.g., heating and cooling a house, cooking).
- Understand how energy comes in different forms and can change forms (i.e. electricity, solar energy, waves, batteries).

### Technology

- Understand that the engineering design process is used in the solution of problems and the advancement of society.
- Identify and explain the steps of the engineering design process, i.e. identify the problem.

- Identify examples of technologies, objects, and processes that have been modified to advance society, and explain why and how they were modified.
- Interpret plans, diagrams, and working drawings in the construction of prototypes or models.
- Identify and explain the engineering properties of materials used.
- Differentiate among conduction, convection, and radiation in a thermal system (e.g., heating and cooling a house, cooking).
- Identify and explain renewable energy sources (e.g., wind and solar energy conversion systems).
- Explain how information travels through the following media: electrical wire, optical fiber, air, and space.
- Differentiate between digital and analog signals and describe how communication devices employ both digital and analog technologies (e.g., computers, cell phones).
- Explain how the various components (source, encoder, transmitter, receiver, decoder, destination, storage, and retrieval) and processes of a communication system function.
- Understand the relationships among voltage, current, and resistance in a simple circuit, using Ohm's law.