

College of Textiles

GRADUATE STUDENT HANDBOOK

Textile Technology
Management Program

Doctor of Philosophy Program in Textile Technology Management

Preface

This handbook is intended to assist you in your graduate study for the TTM Ph.D. degree in the College of Textiles, and thus may answer many of the general questions about the program requirements and policies. It includes information on admission and degree requirements, as well as information on courses, examinations, and academic performance. However, these guidelines will be updated from time to time and students are expected to follow the most recent guidelines (as outlined in the online TTM Handbook).

A number of planning aides are provided, as well as descriptions of currently accepted practices for carrying out each phase of the program. Each student is expected to become familiar with the TTM Ph.D. policies and procedures and to refer to them as an initial source of information on all program matters. The advice and guidance of the chair of the student's advisory committee is critical in making the many decisions required to design a final plan which meets the needs of the student and the requirements of the program.

This information is intended to supplement, and NOT to replace, the general requirements set forth in the Graduate College Catalog published by the Graduate School of North Carolina State University, and the General Graduate Handbook published by the College of Textiles. For the most current information on the program, in addition to the information presented in this handbook, students are encouraged to visit <http://www.tx.ncsu.edu/academic/graduate/ttm/>.

Associate Dean for Graduate Programs
College of Textiles

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¹ Downloadable files of these forms are available at <http://www.tx.ncsu.edu/academic/graduate/ttm/>

INTRODUCTION

Mission and Objectives

Numerous competitive challenges are facing the global textile complex. There is a need for industry and government leaders who can provide knowledge of *products, processes* and *business strategies* to effectively position companies to compete in this global marketplace. The Ph.D. in Textile Technology Management program is designed to educate students for research and management careers in textile technology management in the fiber, textile, apparel, retail and related industries complex, as well as for positions in government and academe. **The graduates of this program are expected to play several roles in industry, government, and other institutions, including:**

1. Carrying out research on issues that relate to the technologies of design, characterization, and manufacture of fibers and fibrous products, management of production and sourcing activities, marketing and distribution of products, international trade, and information requirements. The plethora of raw materials and product specific technologies extant in the industry coupled with the rapid rate at which these technologies are changing challenge students in the program to be innovative in approaches to product development, processes, and strategic business practices. Graduates assume positions in the industry with prime responsibilities for developing policy alternatives for strategic and long range planning.
2. Contributing to the teaching and research in institutions concerned with fiber, textile, apparel, and retail programs.
3. Developing policies at the highest level where broad technical and managerial expertise is required to ensure proper decision-making.

The **educational objectives** of the TTM Ph.D. program are two-fold:

1. To prepare managers for the research and technological enterprises within the fiber, textile, apparel, retail and related industries. To achieve this objective, the programs of study will be designed for each student to acquire and integrate knowledge of the materials and technologies used in the industrial complex by applying those quantitative, qualitative, and analytical techniques of management that would be most useful for their career goals.
2. To prepare graduates to be faculty members in the numerous international colleges and universities.

GENERAL INFORMATION

ADMISSION REQUIREMENTS FOR THE TEXTILE TECHNOLOGY MANAGEMENT (TTM) Ph.D. PROGRAM

Admission to the TTM Ph.D. program is granted by the Graduate School of North Carolina State University, upon recommendation of the Graduate Administrators of the Textile and Apparel Technology and Management (TATM) and Textile Engineering, Chemistry and Science (TECS) Departments, as well as of the TTM Ph.D. Committee. Online application forms are available at <http://www.ncsu.edu/applygrad>. The student must adhere to the application submission dates established by the Graduate School.

Admission to TTM Ph.D. Program

1. Admission requirements from BS degree
 - a. 3.75/4.0 preferred GPA
 - b. Preferred GRE scores** (verbal - 600/800) (quantitative - 600/800) (analytical – 5.0/6.0).
The GRE score should be less than three years old.
 - c. 24 hours of college level calculus/statistics/physics/chemistry – at least 6 hours in calculus and at least 3 hours in each of the others.

2. Admission requirements from the Masters degree
 - a. 3.5/4.0 preferred GPA
 - b. Preferred GRE scores** (verbal - 600/800) (quantitative - 600/800) (analytical – 5.0/6.0).
The GRE score should be less than three years old.
 - c. 24 hours of college level calculus/statistics/physics/chemistry – at least 6 hours in calculus and at least 3 hours in each of the others.

3. For applicants who have 5 years industrial experience in a technology/management interface, these requirements may be relaxed subject to approval from the Textile Technology Management Admissions Committee.

**Graduate Management Admission Test (GMAT) score will be accepted in lieu of GRE scores.
Preferred GMAT scores (verbal and quantitative – 600/800) (analytical – 5.0/6.0)

DEGREE REQUIREMENTS

I. GENERAL

Because the TTM Ph.D. program is multidisciplinary in its requirements with a wide range of choices and options open to the student, considerable planning is required in order to ensure that all the degree requirements and Graduate College requirements are met. **The student must complete a plan of work before the end of the second semester.** No student will be allowed to proceed with research (TTP, TMP) papers until the plan of work has been submitted and approved. A specific TTM Plan of Work (see Appendix A) is required for approval by the TTM Advisory Committee and Director of the Program. The plan of work must include a minimum of 54 hours with a Master's degree or a minimum of 72 hours with a Bachelor's degree. Any exceptions or substitutions for prior work done should be approved by the TTM Program Committee. Students are also expected to prepare and annually update a "portfolio" which will be submitted to the Office of Academic Programs.

The general structure of the program to prepare the **student for admission to candidacy for the Ph.D. degree** is:

1. Complete **Textile Technology Paper (TTP)** requirement (See Section A).
2. Complete **Technology Management Paper (TMP)** requirement (See Section B).
3. Maintain a B average minimum in six courses selected from an approved list of quantitative areas of research methodology.
4. Maintain a B average minimum in six courses selected from technology management related disciplines.
5. Demonstrate proficiency in writing technical documents. Completion of a technical writing course is normally required. The student's advisory committee may also require reading knowledge in a foreign language.
6. Prepare a research proposal and a critical review of the related literature, and successfully defend this proposal in an oral examination.

The student should normally complete defense of both papers (Textile Technology Paper and Technology Management Paper), the technical writing/language requirement, and a formal submission and defense of the research proposal within two years of a Masters admission and three years after BS admission in order to be admitted to candidacy for the Ph.D. degree.

Once admitted to candidacy for the Ph.D. degree, the student must complete a dissertation on a research problem that deals with the textile technology management interface. The student will prepare the written dissertation for review by the student's advisory committee and will defend it in a final oral examination.

II. Ph.D. ADVISORY COMMITTEE

In forming the academic advisory committee, University guidelines should be followed. (<http://www.ncsu.edu/grad/handbook/sections/3.2-advisory-committees.html#A>) Chairs (or at least one Co-Chair) of the student's Advisory Committee shall be members of the TTM Graduate Faculty (see Appendix B) and a full member of the Graduate School whose research is significantly focused on the technology management interface.

III. PROGRAM STRUCTURE

A. Textile Technology Paper (TTP)

The Textile Technology Paper requirement has two components, a **written paper** and an **oral examination**. The student is required to **write and defend in an oral examination, an in-depth, publishable review** on a **topic** from a selected area of textile technology (see Table 1). **The student, in consultation with his/her advising committee chair, is also required to submit a manuscript of the review paper (or an appropriately modified paper, based on the TTP, to meet publication requirements) for publication in an appropriate journal (or presentation at an academically based conference that requires submission of full paper for publication in proceedings).** The manuscript, which would typically be prepared with a faculty member, should be submitted for publication prior to its submission to the Examination Committee (Section A.). The paper must be graded, and the results reported to the Director of the Program **at least** one week before the student undergoes the oral examination (see A.3). A copy of the graded paper is to be submitted to the Academic Programs Office to be retained on file.

A.1 Choice of Subject Area for TTP

The student, with the help of his/her committee chair is required to choose and write an in depth paper in a well-defined area of textile technology. (see Table 1):

TABLE 1. Approved areas of textile technology

- | | |
|--|---|
| 1. MATERIALS TECHNOLOGY | (Polymers, Fibers, Additives, Adhesives) |
| 2. YARN TECHNOLOGY | (Raw Materials, Production Systems, Properties, End-Uses) |
| 3. WEAVING TECHNOLOGY | (Production Systems, Properties, End-Uses) |
| 4. KNITTING TECHNOLOGY | (Production Systems, Properties, End-Uses) |
| 5. NONWOVENS TECHNOLOGY | (Raw Materials, Production Systems, Properties, End-Uses) |
| 6. COLORATION AND FINISHING TECHNOLOGY | (Application & Creation of Color, Functional and Aesthetic Finishes) |
| 7. APPAREL AND "3-D" PRODUCT TECHNOLOGY | (Including Furnishings and Industrial Assembled Products; Formation and Visualization of 3D Structures, Pre-production, Spreading and Cutting, Joining Techniques, Finishing) |
| 8. TEXTILE MEASUREMENT AND CONTROL TECHNOLOGY | (Measurement and Control of Textile Processes and Products, Property Evaluation) |

A.2 Quality of TTP

The student is expected to demonstrate the capability to review a body of knowledge, select from it the literature relevant to the defined topic, and organize the material into a coherent and focused (written) review. The TTP should provide critical insight into the topic in order to identify areas of weakness and/or issues open for further research. In writing the TTP, the student is not expected to contribute novel ideas nor conduct research. Additionally, in order to demonstrate the ability to collate and summarize information, the student is expected to complete the paper in about 30 pages. Normally nine hours of course work at the first-year graduate level is required to prepare for this review. Students with a BS or Masters degree in textiles may satisfy this course work through prior classes.

A.3 Oral Examination: Depth and Breadth Areas of TTP

The student, with the **advice** of his/her committee chair will be required to declare **one area for depth** from the approved list, presented in Table 1, for preparation of the written review paper (TTP) and for the oral examination. In addition, **two areas of breadth** (from the approved list presented in Table 1) should also be declared for the oral examination. It is important to note that the oral examination will cover all of the areas of depth (including the topic of the written paper) and breadth. The knowledge level (formal and informal) is expected to be at the 500 course level for depth and at the 400 course level for breadth areas. The Examination Committee should be formed as per Section A.4.

A.4 TTP Examination Committee

A committee of four will conduct the TTP examination. Two members of the examination committee will grade the written paper. The grading members must be chosen from the appropriate standing committee (Refer to Appendix C) for the declared area of depth. None of the written paper grading members shall be a member of the student's advisory committee. If the paper is not graded as passable, the student continues to revise until judged passable, at which time the oral examination may be scheduled. Two other members of the examination committee should be chosen from the TTM Standing Committees (Refer to Appendix C) representing the two declared areas of breadth, see section A.3. No more than one member of the examination committee shall be from the student's advisory committee and at least one committee member must hold full graduate faculty status. The student's advisory committee/chair in consultation with the program chair will form the TTP examination committee.

The TTP examination committee will conduct an oral examination on the declared areas of depth and breadth (per Section A.3). One member of the TTP examination committee shall be chosen as chair of the committee. The examination committee chair shall ensure guidelines are followed and moderate the presentation and oral examination and also report the grades (per section A.6) to the Academic Dean's office of the College.

A.5 Scheduling TTP Oral Examination

The TTP oral examination should be scheduled only upon the student's successful completion of the written paper evaluation by the two graders (see A.4). *This evaluation should be completed at least one week prior to the oral examination.* The Chair of the student's examination committee should initiate the scheduling of the examination process in consultation with the Academic Dean's office of the College. The Chair of the student's examination committee should submit a Request for Examination (see Appendix E.) to the Associate Dean for Graduate Studies. Students should allow at least 10 days for TTP Examination Committee to grade the written paper.

A.6 Evaluation of Student Performance in TTP

The evaluation of student performance in TTP examination has two distinct components, written paper evaluation and oral examination. **The student must average 80% for the two grades for the written paper assigned by the two grading members of the TTP examination committee. In addition, the student must average at least 80% for the four grades of the oral examination assigned by the four members of the TTP examination committee.** The student has two chances to pass the technology paper requirements. The second attempt should be made within three months of the first attempt.

A.7 Evaluation of the TTP Paper

When judged as a review of a “scholarly paper” the following guidelines may be followed:

90 – 100	Acceptable
80 – 90	Would be acceptable after “minor” revisions in content or format or style
70 – 80	Needs redrafting and requires significant improvement in content or format or style
60 – 70	Topic of paper is appropriate but a major rewrite is required
<60	Unacceptable, badly written, poorly researched, does not address the “area of depth”

B. Technology Management Paper (TMP)

The Technology Management Paper requirement has two components, a **written paper** and an **oral examination**. The student is required to **write and defend in an oral examination**, an **in-depth, publishable review** on a **topic** from a selected area of technology management (see Table 2). **The student, in consultation with his/her advising committee chair, is also required to submit a manuscript of the review paper (or an appropriately modified paper, based on the TMP, to meet publication requirements) for publication in an appropriate journal (or presentation at an academically based conference that requires submission of full paper for publication in proceedings).** The manuscript, which would typically be prepared with a faculty member, should be submitted for publication prior to its submission to the Examination Committee (Section B.4). The paper must be graded, and the results reported to the Director of the Program **at least** one week before the student undergoes the oral examination (see B.3). A copy of the graded paper is to be submitted to the Academic Programs Office to be retained on file.

B.1 Choice of Subject Area for TMP

The student is required to write an in-depth paper in a well-defined area of technology management. (See Table 2):

TABLE 2. Approved areas of technology management

1. **MANAGEMENT OF MANUFACTURING SYSTEMS** (e.g. CAD/CAM, CFM, JIT)
2. **QUALITY MANAGEMENT SYSTEMS** (e.g. TQM, SPC, SIX SIGMA)
3. **INFORMATION SYSTEMS** (e.g. E-Commerce, CIM, Networks, Databases)
4. **MARKETING STRATEGIES** (e.g. Strategic Analysis, Branding)
5. **QUANTITATIVE MODELING AND ANALYSIS** (e.g. Statistical Analysis, Decision Modeling, Industrial Optimization)
6. **DESIGN AND MANAGEMENT OF NEW PRODUCT DEVELOPMENT** (Innovation Management, Opportunity Identification, Design, Market Feasibility, Market Launch)
7. **GLOBAL TRADE** (Trade Agreements, economic analysis of trade impacts, market dynamics related to trade)

B.2 Quality of TMP

The student is expected to demonstrate the capability to review a body of knowledge, select from it the literature relevant to the defined topic, and organize the material into a coherent and focused (written) review. The TMP should provide critical insight into the topic in order to identify areas of weakness and/or issues open for further research. In writing the TMP, the student is not expected to contribute novel ideas nor conduct research. Additionally, in order to demonstrate the ability to collate and summarize information the student is expected to complete the paper in about 30 pages. Normally nine hours of course work at the first-year graduate level is required to prepare for this review. Students with a BS or Masters degree in textiles may satisfy this course work through prior classes.

B.3 Oral Examination: Depth and Breadth Areas of TMP

The student, with the **advice** of his/her committee chair will be required to declare **one area for depth** from the approved list, presented in Table 2, for preparation of the written review paper (TMP) and for the oral examination. In addition, **two areas of breadth** from the approved list presented in Table 2 should also be declared for the oral examination. It is important to note that the oral examination will cover all of the areas of depth (including the topic of the written paper) and breadth. The knowledge level (formal and informal) is expected to be at the 500 course level for depth and at the 400 course level for breadth areas. The Examination Committee should be formed as per Section B.4.

B.4 TMP Examination Committee

A committee of four will conduct the TMP examination. Two members of the examination committee will grade the written paper. The grading members must be chosen from the appropriate standing committee (Refer to Appendix D) for the declared area of depth. None of the written paper grading members shall be a member of the student's advisory committee. If the paper is not graded as passable, the student continues to revise until judged passable, at which time the oral examination may be scheduled. Two other members of the examination committee should be chosen from the TTM Standing Committees (Refer to Appendix D) representing the two declared areas of breadth, see section B.3. No more than one member of the examination committee shall be from the student's advisory committee and at least one committee member must hold full graduate faculty status. The student's advisory committee/chair in consultation with the program chair will form the TMP examination committee.

The TMP examination committee will conduct an oral examination on the declared areas of depth and breadth (per Section B.3). One member of the TMP examination committee shall be chosen as chair of the committee. The examination committee chair shall moderate the presentation and oral examination and also report the grades (per section B.6) to the Academic Dean's office of the College.

B.5 Scheduling TMP Oral Examination

The TMP oral examination should only be scheduled upon the student's successful completion of the written paper evaluation by the two graders (see B.4). This evaluation should be completed at least one week prior to the oral examination. The Chair of the student's examination committee should initiate the scheduling of the examination process in consultation with the Academic Dean's office of the College. The Chair of the student's examination committee should submit a Request for Examination (see Appendix E) to the Associate Dean for Graduate Studies. Students should allow at least 10 days for TMP Examination Committee to grade the written paper.

B.6 Evaluation of Student Performance in TMP

The evaluation of student performance in TMP examination has two distinct components, written paper evaluation and oral examination. **The student must average 80% for the two grades for the written paper assigned by the two grading members of the TMP examination committee. In addition, the student must average at least 80% for the four grades of the oral examination assigned by the four members of the TMP examination committee.** The student has two chances to pass the technology management paper requirements. The second attempt should be made within three months of the first attempt.

B.7 Evaluation of the TTP Paper

When judged as a review of a “scholarly paper” the following guidelines may be followed:

90 – 100	Acceptable
80 – 90	Would be acceptable after “minor” revisions in content or format or style
70 – 80	Needs redrafting and requires significant improvement in content or format or style
60 – 70	Topic of paper is appropriate but a major rewrite is required
<60	Unacceptable, badly written, poorly researched, does not address the “area of depth”

C. RESEARCH-METHODOLOGY IN TECHNOLOGY: COURSE WORK

The student is expected to gain depth in subject areas that support technology management in the context of global competitiveness. To provide this research methodology framework, the student is required to have completed at least 18 hours of course work in areas of research methodology in which a B average or better was attained. Suggested courses meeting these requirements are presented in Table 3. From the list presented in Table 3, the student in consultation with his/her academic advisory committee, will select a minimum of two courses from at least two of the six areas. Students are encouraged to take two of these courses at the 700 level or higher. These courses normally will be taken at NCSU.

TABLE 3: Suggested courses in areas of research methodology

1.	STATISTICS	ST 513 - Statistics for Management I ST 514 - Statistics for Management and Social Sciences II ST 515 - Experimental Statistics for Engineers I ST 516 - Experimental Statistics for Engineers II ST (MA) 546 - Theory of Probability I ST 708 - Applied Least Squares ST 711 - Design of Experiments BUS 550 – Statistics and Quantitative Methods IE 748 - Quality Engineering
2.	OPERATIONS RESEARCH	OR 501 - Introduction to Operations Research OR 504 - Introduction to Mathematical Programming OR MA) (IE) 505 - Linear Programming OR 709 - Dynamic Programming OR 761 (IE) - Queues and Stochastic Service Systems OR 766 - Network Flows OR 773 - Stochastic Modeling OR (CSC) (IE) 762 - Computer Simulation Techniques IE 723 - Production Planning, Scheduling and Inventory Control IE 754 - Logistics Engineering

3. **MATHEMATICS** MA 501 - Advanced Mathematics for Engineers and Scientists I
MA 502 - Advanced Mathematics for Engineers and Scientists II
MA 511 - Advanced Calculus I
MA 512 - Advanced Calculus II
MA 521 - Abstract Algebra I
MA 532 - Ordinary Differential Equations I
MA 534 – Introduction to Partial Differential Equations

4. **DECISION THEORY** ACC 515 - Accounting Theory and Current Issues
ACC 521 - Production Cost Analysis and Control
ACC 580 - Survey of Accounting
BUS 562 - Marketing Research
IE 518 - Manufacturing Operations Management**
IE 711 - Capital Investment Economic Analysis
IE 712 - Bayesian Decision Analysis
IE 721 - Advanced Problems in Management Systems
IE 725 - Organizational Planning and Control
IE 731 - Multi-Attribute Decision Analysis
OR (ST) (BMA) 722 - Decision Analytic Modeling
OR (IE) (IE) 772 - Stochastic Simulation Design and Analysis
TTM 535 - Research Management in Science and Engineering

5. **INFORMATION SCIENCES** CSC 517 - Object-Oriented Languages and Systems
CSC 520 - Artificial Intelligence I
CSC (IE) 546 - Management Decision and Control Systems
CSC 570 - Computer Networks
CSC 742 - Database Management Systems
IE 716 - Computer-Aided Manufacturing
IE 719 - CIM System Design

6. **ECONOMETRICS** ECG 506 - Applied Macroeconomic Analysis
ECG 521 - Markets and Trade
ECG 555 - Managerial Economics
ECG (ST) 561 - Intermediate Economics
ECG 700 - Price Theory
ECG 703 - Applied Macroeconomic analysis
ECG 706 - Industrial Organization and Control
ECG 748 - Theory of International Trade
ECG 749 - Monetary Aspects of International Trade
ECG 751 - Econometrics
ECG 765 - Mathematical Methods for Economics

**not accepted as co-major course in IE

D. TECHNOLOGY MANAGEMENT: COURSE WORK

The student is expected to develop additional depth in disciplines that support the chosen research program as well as gain exposure to broader issues in technology management. This course work could be structured to meet the Graduate school requirements for a “minor”. **The student is required to have completed at least 18 hours of course work at the 500 level or higher in the suggested areas of technology management represented in Table 4 in which a B average or better was attained:**

TABLE 4: Suggested areas of technology management course work

1. Strategic planning in a global environment
2. Economics and international trade
3. Financial management in the global industry
4. Global textile marketing
5. Strategic product development
6. Technology forecasting and bench-marking
7. Econometrics of innovation and invention
8. Agile product replenishment, design and development strategies
10. Management of technology transfer in industry
11. Strategic quality management systems
12. Textile business and social policy
13. Issues in business and ethics
14. Issues of language and culture
15. Industrial relations, labor law and management
16. Issues in organizational design and culture
17. Strategic management of production, marketing and R&D
18. Demand-supply chain design and management
19. Impact of globalization on product development and sourcing
20. Impact of information technology on production and marketing
21. Issues in performance measurements of complex systems
22. Impact of modern production technology
23. Product and process evaluation, control and optimization

E. LANGUAGE REQUIREMENT

All students must demonstrate proficiency in writing technical documents in cogent and coherent English. Students whose native language is English can meet this requirement by successfully completing a technical writing course (ENG 331/332/333 - Communication for Science and Research) in English while enrolled in a College or University in the USA, United Kingdom, Canada, Ireland, Australia, or New Zealand. Students whose native language is not English may fulfill this requirement by passing FLE 402 - Written communication in English for International Students. Students with publications clearly written by them may petition the TTM Graduate Committee through their advising committee chair for waiver of this requirement.

A student’s advisory committee may require demonstration of reading knowledge in a foreign language as an additional requirement beyond the technical writing requirement specified above. The Department of Foreign Languages conducts testing for proficiency.

F. RESEARCH PROPOSAL/PRELIMINARY ORAL EXAMINATION

The last step in satisfying the requirements for candidacy for the Ph. D. degree is submission of the research proposal for the preliminary oral examination. The research proposal should be a substantial paper of at least 50 pages, which critically reviews the pertinent literature, identifies the broad problem area, defines the specific research objectives and hypothesis, and outlines the specific research strategies, methodologies and analytical techniques. Upon acceptance of the written proposal by the Advisory Committee, after approximately two weeks after submission to the committee, an oral examination based on the paper and a presentation by the student will be conducted. The preliminary oral examination must not be delayed more than two years after MS admission and 3 years after BS admission. All students admitted to doctoral programs are allowed a maximum of six (6) calendar years from admission to the doctoral program to attain candidacy for the degree and a maximum of 10 calendar years to complete all degree requirements. A copy of the preliminary examination proposal is to be submitted to the Academic Programs Office to be retained on file.

G. DISSERTATION/FINAL ORAL EXAMINATION

All students must complete a dissertation on a research problem that deals with the textile technology-management interface. The problems in this interface may involve (1) study of the impact of manufacturing and marketing technologies of choice on the management or decision making processes in the textile complex, (2) the impact of the management decision making processes on the choice of technologies, (3) analyses that help develop policy within fiber-textile-apparel-retail companies relevant to the unique combination of manufacturing and marketing technologies. The final oral examination must be defended within University guidelines using the "Request for Approval to Schedule Doctoral Oral Examination. See <http://www.ncsu.edu/grad/faculty-and-staff/forms-list.html>.

Textile Technology Management Ph. D. Plan of Graduate Work

Date _____

For _____ - _____
Last Name First Middle Student I. D. Number

Date Degree Expected _____
Month Year

Modern Language (if required) _____

Subject of Dissertation _____

A. Advisory Committee

Name Signature (Chair)

Name Signature (Co-Chair, if applicable)

Name Signature (Member)

Name Signature (Member)

Minor Representative Signature (Minor Representative)

B. Textile Technology Paper (TTP)

Planned date of examination _____
Month Year

Depth Area _____

Breadth Area (1) _____ Breadth Area (2) _____

Textile Technology Paper (TTP) Examination Committee

(Note: At least one grading member of committee must hold Full Member status in Graduate School.)

Grading Members Other Members

1. _____
Examination committee chair

2. _____

3. _____

4. _____

Textile Technology Management Ph. D. Plan of Graduate Work

C. Textile Management Paper (TMP)

Planned date of examination _____
Month Year

Depth Area _____

Breadth Area (1) _____ Breadth Area (2) _____

Textile Management Paper (TMP) Examination Committee

(Note: At least one grading member of committee must hold Full Member status in Graduate School.)

Grading Members

Other Members

1. _____
Examination committee chair

3. _____

2. _____

4. _____

D. GRADUATE WORK PROPOSED

RESEARCH METHODOLOGY COURSES (18 Cr. hours required)

Course Prefix and Title	Credits	Term	Grade
Mathematics			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Statistics			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Operations Res.			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Decision Theory			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Information Sci.			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Economics			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
Subtotal	_____	_____	_____

TECHNOLOGY MANAGEMENT COURSES (18 Cr. hours required)

Course Prefix and Title	Credits	Term	Grade
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Subtotal	_____	_____	_____

Textile Technology Management Ph. D. Plan of Graduate Work

E.	Graduate Seminar (attend for two semesters)	Credits	Term	Grade
	_____	_____	_____	_____
	_____	_____	_____	_____

Subtotal _____

F.	Research Hours	Credits	Term	Grade
	Dissertation Research or Prep (<i>Specify TTM 893 or TTM 895</i>)			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

Other _____

Subtotal _____

G. Total Number of Hours	Total	_____
---------------------------------	--------------	-------

Student Signature

Date

Approved _____
Associate Dean for Graduate Programs

Date

Appendix B.

Textile Technology Management Faculty

TTM Graduate Faculty

* denotes Associate Member of Graduate School Faculty

- N. Anantharamaiah** Research Assistant Professor*
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=528
- P. Banks-Lee** Associate Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=2
- R. L. Barker** Burlington Distinguished Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=5
- K. A. Thoney-Barletta** Assistant Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=114
- R. A. Barnhardt** Dean Emeritus and Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=6
- S. K. Batra** Charles A. Cannon Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=8
- K. R. Beck** Professor and Department Head
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=9
- C. C. Bozarth** Associate Professor*
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/cbozarth.html>
- K. Carroll** Assistant Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=560
- N. Cassill** Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=21
- S. N. Chapman** Associate Professor
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/schapman.html>
- T. G. Clapp** Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=25

- S. E. Elmaghraby** University Professor
Operations Research and Industrial Engineering
<http://www.ie.ncsu.edu/elmaghraby/index.html>
- S. C. Fang** Walter Clark Professor
Industrial Engineering and Operations Research
<http://www.ie.ncsu.edu/fang/index.html>
- H. S. Freeman** Associate Dean and Ciba-Geigy Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=39
- T. K. Ghosh** Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=41
- A. Blanton Godfrey** Dean and Joseph D. Moore Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=42
- R. E. Gorga** Assistant Professor*
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=360
- B. S. Gupta** Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=45
- H. Hamouda** Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=46
- R. B. Handfield** Bank of America Distinguished University Professor
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/rhandfield.html>
- P. J. Hauser** Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=47
- H. H. Hergeth** Associate Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=50
- D. Hinks** Associate Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=52
- G. L. Hodge** Associate Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=53
- T. J. Hodgson** James T. Ryan Professor
Industrial Engineering
<http://www.ie.ncsu.edu/hodgson/index.html>

D. M. Holthausen	Professor Economics http://www.mgt.ncsu.edu/faculty/economics/dholthausen.html
C. L. Istook	Professor Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=56
W. J. Jasper	Professor Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=57
J. A. Joines	Associate Professor Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=60
M. R. Jones	Assistant Professor* Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=61
M. W. King	Professor Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=63
R. E. King	Professor Industrial Engineering http://www.ie.ncsu.edu/king/index.html
R. E. Kotek	Associate Professor* Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=65
W. E. Krause	Assistant Professor* Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=342
T. M. Lamar (May)	Assistant Professor* Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=76
H. J. Lee	Assistant Professor* Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=485
T. J. Little	Professor and Department Head Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=70
S. E. Margolis	Professor and Department Head Economics http://www.mgt.ncsu.edu/faculty/economics/smargolis.html
B. Maze	Research Assistant Professor* Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=323

- J. McCreery** Associate Professor*
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/jmccreery.html>
- S. Michielsen** Associate Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=362
- M. M. Montoya-Weiss** Professor*
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/mweiss.html>
- M. Moore** Associate Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=561
- H. L. Nuttle** Professor
Industrial Engineering
<http://www.ie.ncsu.edu/nuttle/index.html>
- W. Oxenham** Associate Dean and Abel C. Lineberger Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=89
- B. Pourdeyhimi** Associate Dean, William A. Klopman Distinguished Professor and
Director of NCRC
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=94
- N. Powell** Associate Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=221
- M. Rappa** Alan T. Dickson Distinguished University Professor
Business Management
<http://www.mgt.ncsu.edu/faculty/busmgt/mrappa.html>
- J. P. Rust** Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=101
- A. M. Seyam** Professor
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=106
- R. Shamey** Associate Professor
Textile Engineering, Chemistry and Science
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=369
- E. Shim** Visiting Assistant Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=357
- G. W. Smith** Associate Professor*
Textile and Apparel, Technology and Management
http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=109

M. W. Suh	Professor Textile and Apparel, Technology and Management http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=111
A. E. Tonelli	INVISTA Professor Textile Engineering, Chemistry and Science http://www.tx.ncsu.edu/faculty_center/directory/detail.cfm?id=116
J. R. Wilson	Professor and Department Head Industrial Engineering http://www.ie.ncsu.edu/jwilson/index.html

Professors Emeritus

D. R. Buchanan	Professor Emeritus of Textile Engineering, Chemistry and Science
J. R. Canada	Professor Emeritus of Industrial Engineering
R. A. Donaldson	Professor Emeritus of Textile and Apparel, Technology and Management
A. H. El-Sheikh	Professor Emeritus of Textile and Apparel, Technology and Management
P. L. Grady	Professor Emeritus of Textile Engineering, Chemistry and Science
C. D. Livengood	Professor Emeritus of Textile Engineering, Chemistry and Science
G. Mock	Professor Emeritus of Textile Engineering, Chemistry and Science
M. H. Mohamed	Professor Emeritus of Textile Engineering, Chemistry and Science
C. B. Smith	Professor Emeritus of Textile Engineering, Chemistry and Science
C. Tomasino	Professor Emeritus of Textile Engineering, Chemistry, and Science
S. C. Winchester	Professor Emeritus of Textile and Apparel, Technology and Management

Appendix C.

TTM STANDING COMMITTEES - TEXTILE TECHNOLOGY PAPER

* denotes Associate Member of Graduate School Faculty

Apparel and “3-D” Product Technology

Katherine Carroll* – TATM
Tushar Ghosh – TATM
Cynthia Istook – TATM
R. E. King – IE
Traci Lamar (May)* – TATM
Hoon Joo Lee* - TATM
Trevor Little – TATM
Henry Nuttle – IE
Nancy Powell* – TATM

Coloration and Finishing Technology

Keith R. Beck – TECS
Harold Freeman – TECS
Peter Hauser – TECS
David Hinks – TECS
Stephen Michielsen – TATM
Nancy Powell* – TATM
Renzo Shamey – TECS
C. Brent Smith – TECS

Knitting Technology

Tushar Ghosh – TATM
Helmut Hergeth* – TATM
William Oxenham – TATM
Nancy Powell* – TATM
A. M. Seyam – TATM
Gary W. Smith* – TATM
Moon Suh – TATM

Materials Technology

Nagendra Anantharamaiah* – TECS
Pam Banks-Lee – TATM
Roger Barker – TECS
Russell Gorga* – TECS
Martin King – TATM
Richard Kotek* – TECS
Wendy Krause* – TECS
Hoon Joo Lee* – TATM
Trevor Little – TATM
Benoit Maze* – TECS
Stephen Michielsen – TATM
William Oxenham – TATM
Behnam Pourdeyhimi – TATM
Jon Rust – TECS

Nonwoven Technology

Nagendra Anantharamaiah* – TECS
Pamela Banks-Lee – TATM
Subhash Batra – TATM
Tushar Ghosh – TATM
Russell E. Gorga* – TECS
Wendy Krause* – TECS
Benoit Maze* – TECS
Stephen Michielsen – TATM
Behnam Pourdeyhimi – TATM
A. M. Seyam – TATM

Textile Measurement and Control

Nagendra Anantharamaiah* – TECS
Pamela Banks-Lee – TATM
Timothy Clapp – TECS
Tushar Ghosh – TATM
Stephen Michielsen – TATM
David Hinks – TECS
Warren Jasper – TECS
Martin King – TATM
Benoit Maze* – TECS
Behnam Pourdeyhimi – TATM
Jon Rust – TECS
A. M. Seyam – TATM
Moon Suh – TATM

Weaving Technology

Pamela Banks-Lee – TATM
Tushar Ghosh – TATM
William Oxenham – TATM
Behnam Pourdeyhimi – TATM
Nancy Powell* – TATM
A. M. Seyam – TATM

Yarn Technology

Robert Barnhardt – TATM
Tushar Ghosh – TATM
Helmut Hergeth* – TATM
William Oxenham – TATM
Jon Rust – TECS
A. M. Seyam – TATM
Moon Suh – TATM

Appendix D.

TTM STANDING COMMITTEES - TEXTILE MANAGEMENT PAPER

* denotes Associate Member of Graduate School Faculty

Design and Mgmt of New Product Dev

Nagendra Anantharamaiah* – TECS
Katherine Carroll* – TATM
Nancy Cassill – TATM
Timothy Clapp – TECS
Helmut Hergeth* – TATM
Cynthia Istook – TATM
Michelle Jones* – TATM
Traci Lamar (May)* – TATM
Hoon Joo Lee* – TATM
Benoit Maze* – TECS
J. McCreery* – BM/CoM
Mitzi Montoya-Weiss* – BM/CoM
Nancy Powell* – TATM
Behnam Pourdeyhimi – TATM
A. Seyam – TATM

Global Trade

Robert Barnhardt – TATM
Nancy Cassill – TATM
Helmut Hergeth* – TATM
Michelle Jones* – TATM
Hoon Joo Lee* - TATM
Trevor Little – TATM
Marguerite Moore* – TATM
William Oxenham – TATM
Behnam Pourdeyhimi – TATM
Nancy Powell* – TATM
Moon Suh – TATM

Information Systems

Nancy Cassill – TATM
Timothy Clapp – TECS
Blanton A. Godfrey – TATM
George Hodge – TATM
Cynthia Istook – TATM
Jeffery A. Joines – TECS
Michelle Jones* – TATM
Marguerite Moore* – TATM
William Oxenham – TATM
Michael Rappa – BM/CoM
A. M. Seyam – TATM
Kristin Thoney-Barletta* – TATM

Marketing Strategies

Katherine Carroll* – TATM
Nancy Cassill – TATM
Blanton A. Godfrey - TATM
Helmut Hergeth* – TATM
George Hodge - TATM
Duncan Holthausen – EC/CoM
Cynthia Istook – TATM
Michelle Jones* – TATM
Traci Lamar (May)* – TATM
Trevor Little – TATM
Mitzi Montoya-Weiss* – BM/CoM
Marguerite Moore* – TATM

Management of Manufacturing Systems

Cecil Bozarth* – BM/CoM
Katherine Carroll* – TATM
Stephen Chapman – BM/CoM
Blanton A. Godfrey – TATM
Robert Handfield – BM/CoM
George Hodge – TATM
Thom Hodgson – IE
Cynthia Istook – TATM
Jeffery A. Joines – TECS
R. E. King – IE
Traci Lamar (May)* – TATM
Hoon Joo Lee* – TATM
A. M. Seyam – TATM
Moon Suh – TATM
Kristin Thoney-Barletta* – TATM

Quality Management Systems

Pamela Banks-Lee – TATM
Cecil Bozarth* – BM/CoM
Stephen Chapman – BM/CoM
Timothy Clapp – TECS
Blanton A. Godfrey – TATM
George Hodge – TATM
A.M. Seyam – TATM
Moon Suh – TATM
Kristin Thoney-Barletta* – TATM

Appendix D. cont'd

TTM STANDING COMMITTEES - TEXTILE MANAGEMENT PAPER

* denotes Associate Member of Graduate School Faculty

Quantitative Modeling and Analysis

Subhash Batra – TATM

Shu-Cherng Fang – IE

Blanton A. Godfrey – TATM

George Hodge – TATM

Thom Hodgson – IE

Jeffery A. Joines – TECS

R. E. King – IE

Henry Nuttle – IE

Marguerite Moore* – TATM

Appendix E. Page 1 of 2

Request for Textile Technology Paper/
Technology Management Paper Examination

Textile Technology Management Ph.D. Program
Request to Schedule Oral Examination

To: Dr. William Oxenham Associate Dean and Director Graduate Programs Date _____
_____ Textile Technology Paper _____ Technology Management Paper
Student Name _____ ID Number _____
Title of Paper _____

Depth Area _____

Breadth Area (1) _____ Breadth Area (2) _____

Proposed Date of Oral Examination _____

Examination Committee

Oral presentation & Written paper grader Prof. _____, Chair

Oral presentation & Written paper grader Prof. _____

Oral presentation only Prof. _____

Oral presentation only Prof. _____

Has the written paper been submitted for publication? Yes/No

Has the written paper been accepted for publication? Yes/No/Pending

Name of Journal/Conference¹: _____

Date of submission for evaluation by the TTP/TMP Examination Committee _____

Grades of written paper evaluation² (1) _____ (2) _____

Written Paper Grade (Mean) _____

Approval to schedule oral examination

Associate Dean, Graduate Studies Date _____

¹Attach a copy of the publication guidelines (Notes to Authors) for the Journal for reference

²Use additional pages for comments

PLEASE SEE REVERSE SIDE FOR ADDITIONAL INFORMATION

Request for Textile Technology Paper/
Technology Management Paper Examination

Textile Technology Management Ph.D. Program
Report of Results of Oral Examination
Textile Technology Paper (TTP)
Technology Management Paper (TMP)

To: **Dr. William Oxenham** Date: _____
Associate Dean and Director
Graduate Programs

_____ Textile Technology Paper _____ Technology Management Paper

Student Name _____ ID Number _____

Title of Paper _____

TTP/TMP Examination Grades³

Oral Presentation (1) _____ Oral Presentation (2) _____

Oral Presentation (3) _____ Oral Presentation (4) _____

Oral Exam. Grade (Mean) _____

Examination Committee Chair _____ Date _____

³The student must average 80% for the two grades for the written paper assigned by the two grading members of the TTP/TMP examination committee. In addition, the student must average at least 80% for the four grades of the oral examination assigned by the four members of the TTP/TMP examination committee.

APPENDIX F.

**Recommended Time-line for Program Completion
With M.S. degree****

	1 st semester	2 nd semester	3 rd semester	4 th semester	5 th semester	6 th semester
Research topic and advisor identified						
Submission of Plan of work for approval						
Successful Completion of TTP or TMP Paper						
Successful Completion of remaining TTP or TMP Paper						
Submission of Research proposal/ Preliminary oral exam						
Student will perform research on at least half-time basis						
Schedule and defend thesis; Submit thesis to Thesis Editor						

****Students entering the program with a B.S. degree are allowed an extension of 1.5 - 2 years due to the 72 credit hours of coursework requirement**