

**MASTER OF SCIENCE  
IN  
TEXTILE ENGINEERING**



**Programme Booklet  
(2011)**

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## ***Disclaimer:***

Whilst the University endeavours to ensure that the information provided in this booklet is accurate at the date of publication it does not accept liability for any errors or omissions. It is issued for the general guidance of postgraduate students taking admission in the programme. The University intends to offer the courses and facilities described in the booklet but it reserves the right to withdraw or make alterations in these courses or facilities if deemed necessary without any prior notice.

# 1. Introduction

Textiles play a very important role in the economic well being of Pakistan. It is one of the biggest employers and exporters of goods in the country. Notwithstanding its pivotal position in the Pakistani economy, the textile industry, for its survival, relies very much on the technological developments that take place abroad. This is mainly due to the lack of highly qualified and trained staff that is capable of initiating and managing applied research and development projects related to the current and future technological needs of the Pakistani textile industry.

National Textile University is located in the heart of Pakistani Textile Industry in Faisalabad. It enjoys a good national and international reputation for its undergraduate programmes related to textiles. The university has internationally qualified and experienced faculty, which understands the needs of the textile industry and therefore is now embarking on establishing a postgraduate programme in the field of textile engineering. This course will enable the bachelor degree holders to undertake postgraduate studies in textiles. The major aim of the programme is to support the textile industry to take on in-house applied research and development in order to develop new processes and products, which will provide a competitive edge to the Pakistani textile manufacturers in the international arena. The results of the research projects will be disseminated through the publication of peer review papers, presentations at conferences and seminars at the national and international levels and through close liaison with the Pakistani textile industry. The programme will also help initiate research projects between the university and other national and international research organisations and institutions of higher learning.

## 2. Programme Objectives

The M.Sc. Textile Engineering programme aims to create a higher learning culture that enables participants to:

1. Engage and benefit from exposure to modern and advanced industrial developments, new textile materials, research methodologies and their applications in industrial environment;

2. Equip graduates with relevant knowledge and skills ready for employment and/or career progression in textile related industries.
3. Use in-depth understanding of textile production processes, properties and behaviour in order to envisage and devise novel applications in the area of technical and functional textiles to ensure high value of quality and standards;
4. Develop novel approaches to solve technological problems and shortcomings;
5. Appreciate technological, environmental, economical and cultural factors that may influence material choice, manufacturing design, processing conditions and mode of application; and
6. Enhance the management capabilities of graduates in production, marketing, quality, research and development activities in textile related industries.
7. Establish and strengthen linkage with the textile industry for the mutual benefits of the industry and university.

### **3. Programme Structure**

The M.Sc. Textile Engineering is a 2-years (4 semesters) programme covering a vast range of new textile materials, modern industrial developments, engineering details of fibrous materials, advanced analytical technique, product development and so on, research methodology, productivity management and financial/marketing techniques.

The programme offers minimum eight courses and a research project. Each course is of 3 credits and the research project is of 6 credits. Accumulation of minimum 30 credits in total, including research project, leads to the award of Degree in M.Sc. Textile Engineering.

The total subjects being offered during the programme are as under:

- |             |  |        |
|-------------|--|--------|
| 1. TE – 571 | Advanced Textile Materials                   | 3(3–0) |
| 2. TE – 572 | Technical Textiles                           | 3(3–0) |
| 3. TE – 573 | Advanced Textile Process and Quality Control | 3(3–0) |

4.	TE – 574	Non-woven Textiles	3(3–0)
5.	TE – 575	Medical Textiles	3(3–0)
6.	TE – 671	Textile Composites	3(3–0)
7.	RM – 571	Research Methodology	3(3–0)
8.	RM – 671	Analytical Techniques	3(3–0)
9.	TE – 679	Research Project	6(0–18)

The project work can be undertaken in an industrial concern, where possible, ensuring both the relevance to the employer, access to appropriate facilities, and allowing sufficient time to be spent on the practical work. Alternatively, projects could be based and carried out at the university. In case of collaboration with other national and international research institutes and universities the final semester research projects can be completed in those organisations.

## 4. Programme Duration

The students are required to complete the M.Sc. Textile Engineering Degree in a minimum period of 2 years (4 semesters) and maximum of 3 years (6 semesters).

## 5. Admission Requirements

The applicant holding a B.Sc. Textile Engineering degree or any other equivalent degree from the HEC recognised institution with a minimum CGPA 2.50 out of 4.00, 3.50 out of 5.00 or 1<sup>st</sup> Division is eligible to apply. The candidate must have completed at least 124 credit hours under the semester system or have studied at least 4 years under the annual system in the bachelor engineering degree. Those with unrelated majors will have to complete deficiency courses before starting M.Sc. Textile Engineering programme as determined by the BOS/University.

The admission will be purely on merit and will be granted to the applicants on the basis of their performance in the following areas:

- B.Sc. Engineering (60 % weightage)
- NTS GAT (General) Test or Equivalent (30% weightage)

- Interview result (10 % weightage)
- Practical experience (preferable)

## 6. Fee Structure

<b>Admission Fee:</b>	Rs. 15,000/-, to be paid at the time of admission.
<b>Security Deposit:</b>	Rs. 5,000/-, to be paid at the time of admission. The deposit, minus the cost of damages, if any, will be refunded at the completion of degree.
<b>Development Charges</b>	Rs. 5,000/-, to be paid at the time of admission.
<b>Tuition Fee:</b>	Rs. 3,000/credit hour payable at the time of registration of each course (minimum credit per semester = 9).
<b>Degree Fee:</b>	Rs. 2,500/-, to be paid at the time of admission.
<b>Degree Verification Fee:</b>	Rs. 1,000/-, to be paid at the time of admission.
<b>Student's Activity Fund:</b>	Rs. 1,000/-, to be paid in each semester.
<b>Transport Charges:</b>	Rs. 1,000/-, to be paid in each semester.
<b>Medical Fee:</b>	Rs. 500/-, to be paid in each semester.
<ul style="list-style-type: none"> <li>• <b>Total dues at admission:</b></li> </ul>	<b>Rs. 58,000/-</b>
<ul style="list-style-type: none"> <li>• <b>Subsequent dues per credit hour:</b></li> </ul>	<b>Rs. 3,000/-</b>

## 7. Course Assessment

Key skills will be developed and assessed at appropriate stages during each part of the course. The aims of the course assessment are as follows:

1. To maximise the learning and skills development of the students;
2. To demonstrate that sufficient depth and breadth of learning have taken place;

3. To allow subject specific and core skills enhancement to occur during the assessment process;
4. To be progressive, building confidence through the assignment materials, and providing appropriate feedback at regular intervals; and
5. To ensure that the research projects have been satisfactorily completed.

## **8. Academic Rules**

### **8.1 Course/Research Project Registration**

Students shall be required to register for the courses/research projects before the start of each semester as announced by the university. Any change in course registration shall be allowed only in the first two weeks of the semester.

A regular student is required to take 9 credit hours per semester. However, a student can take maximum 12 credit hours, if she/he is graduating in that semester.

A student can take up to 6 credit hours during a summer semester, if offered.

### **8.2 Withdrawal of Course(s)**

A student may only be allowed to withdraw from course(s) with the permission of the incharge graduate studies and research. Non-attendance shall not constitute an official withdrawal. Student shall be awarded “W” grade for the course(s) if withdrawn before the mid semester examination. In case of withdrawal after the mid semester “F” grade shall be awarded.

### **8.3 Attendance Requirement**

Students shall be required to maintain a minimum of 75 % of class attendance in each course, adhere to the university academic calendar and attend regularly all lectures, seminars, discussions and field work as may be specified for a course in a semester. Failure to meet attendance requirement shall render the students ineligible for appearing in the final examination of the concerned course and “F” grade shall be awarded the course.

## 8.4 Academic Evaluation

Formative feedback on coursework will be given on regular basis. In order to give appropriate feedback, all assignments submitted by deadlines, will be returned to the students within the specified period.

The following shall be scheduled during a semester for the purpose of academic evaluation of students:

- i. **Quiz Tests:** Quiz tests shall be conducted at irregular intervals through the semester, with or without intimation.
- ii. **Assignments:** Assignments relative to the course shall be given during the semester.
- iii. **Mid Semester Exam:** A 2-hour written test shall be conducted during the semester after 8 week of studies.
- iv. **End Semester Exam:** A 3-hour written test shall be conducted at the end of 16 weeks of studies.
- v. **Projects:** Project is a research work aimed at assessing the ability of a student to translate the theoretical knowledge acquired during the academic programme into practical use to create new knowledge/product/process for the benefit of the mankind and economical development of the country.

The weightage of the examinations, quizzes and assignments shall be as under:

- Quizzes/Assignments 30 %
- Mid-Semester Examination 30 %
- End-Semester Examination 40 %

End semester examination is mandatory, irrespective of the total marks obtained in quizzes, assignments and mid semester examination.

The performance of students in a course of study is graded as follows:

Grade	Grade Point	Percentage	Description
A	4.00	85 & above	Excellent
B+	3.50	80-84.9	Very Good
B	3.00	75-79.9	Good
C+	2.50	70-74.9	Above Average
C	2.00	65-69.9	Average

D+	1.50	60-64.9	Below Average
D	1.00	50-59.9	Pass
F	00.00	Below 50	Fail
I			Incomplete
W			Course Withdrawn

### **Computation of semester grade point average (GPA) and cumulative grade point average (CGPA)**

Semester Grade Point Average (GPA) and Cumulative Grade Point Averages (CGPA) will be calculated using the following relationships:

$$\text{GPA} = \frac{\text{Sum over Courses in Semester (Course Credit Hours x Grade Point Earned)}}{\text{Total Semester Credit Hours}}$$

$$\text{CGPA} = \frac{\text{Sum over all taken Courses in all Semesters (Course Credit Hours x Grade Point Earned)}}{\text{Total Credit Hours Taken in all Semester}}$$

### **8.5 Unfair Means in Examination:**

Any student found cheating or using unfair means in the examination (mid/final exams, quizzes, assignments, practicals and research projects) will be dealt severely which may lead to expulsion from the university. The university misconduct/disciplinary rules will be applicable to such cases.

### **8.6 Repetition of Courses/Summer Semester**

Students may repeat the courses in which they obtained an “F”, “D”, “D+” or “C” grade. In such case, all grades achieved by the student shall appear on the transcript. The cumulative grade point average for a semester shall be calculated by substituting old grade with the grades obtained after repetition of courses. The students are not allowed to repeat courses for improvement of grades except probationer students with “D”, “D+” and “C” grades. The courses will be offered with a minimum class formation of four students in each course.

### **8.7 Incomplete Research Project**

An “I” grade is given to a student in a research project, if the student does not complete project requirements within the prescribed time-limits, and the supervisory committee is satisfied that it was because of the circumstances beyond the control of the student. Incomplete grade “I” shall not be considered in GPA/CGPA calculations. However, it is the

responsibility of the student to complete the remaining work of the research project in the given time period, failing which the “I” grade shall be converted to “F” grade.

### **8.8 Make-up Examination**

If a student fails to appear in the Mid Semester or End Semester Examination due to unavoidable circumstances that is the death of mother, father, brother or sister or severe illness/hospitalization but otherwise complies with other course requirements such as attendance, completion of assessment activities etc. Then on the recommendations of the course(s) teacher(s) and Head of the programme the make-up examination may be arranged after the approval of make-up examination committee duly constituted by the competent authority of the university. Any such examination, if allowed, shall be held within three weeks of the examination of which the student is defaulter.

### **8.9 Semester Drop Rules**

If a student drops a semester with the prior permission and approval of the university in the first week of the semester the tuition fee shall be refunded. Students dropping semester after the first week shall not be allowed to get any refund.

If a student drops a semester without formal approval of the university, his/her admission shall stand cancelled.

### **8.10 Promotion Rules:**

The minimum requirement for promotion to the second semester of the programme shall be SGPA of 1.00 in the first semester. If a student obtains SGPA less than 1.00 in the first semester, he/she shall be ceased to be on the roll of the University and shall not be eligible for the admission in the same programme of the University in future.

### **8.11 Probation Rules:**

For graduation, the minimum qualifying CGPA is 2.50. Whenever a student's CGPA is below 2.50 in any semester, the student will be on 1<sup>st</sup> probation. If the student does not improve/maintain to CGPA 2.50 in any subsequent semester including summer, he will be on final probation. If the student does not come out of the final probation by achieving the minimum CGPA of 2.50 in the next regular or summer semester, the student shall be expelled and can not be re-admitted in the programme.

## 9. Degree Completion Requirements

In order to satisfy the requirements for the award of a M.Sc. Textile Engineering Degree, the candidate must have to complete 30 credits, by accumulating 24 credits from the taught courses and further 6 credits from the research project with a minimum CGPA of 2.50. In research project, the minimum passing grade is “B”

## 10. Course Descriptions

### **TE – 571 Advanced Textile Materials 3(3–0)**

Natural fibres like cotton, wool and silk which have existed for millenniums, and have been in the use of human being for ages have a high aesthetic appeal in fashion fabrics. They were also used in engineering applications until the synthetic fibres such as nylon, polyester, polyacrylonitrile etc. were introduced in the first half of the twentieth century. These manmade fibres offered not only the superior technical properties but showed also better performance qualities as fashion fabrics. These synthetic fibres were introduced to replace natural fibres, and to some extent the object was attained.

During the 1980s a new generation of manufactured fibres became available which are high-modulus, high-tenacity fibres. The other kinds of new generation fibres are high thermal and chemical resistant. These fibres are not simply alternatives to the natural fibres or the synthetic fibres which emerged during the first half of the last century but they find applications in technical textiles, sports, transportation, air, space and oceans.

This course has been designed to provide students through knowledge of the fundamentals of fibre structure, development history of manmade fibres and fibre manufacturing technologies. The students will also be taught about the structure, properties, processing and application of high performance fibres like aramids, carbon fibres, glass fibres, ceramic fibres, high-modulus and high-tenacity polyethylene fibres, chemically and thermally resistant fibres.

### **TE – 572 Technical Textiles (3 0 3)**

Technical textiles comprise textile materials and products which are manufactured and used primarily for their performance and functional features rather than for their aesthetics. World technical textiles consumption is estimated to be around 24 million tons with an approximate value of US\$127 billion by 2011. The consumption is expected to grow by 4.6% per annum in Asia and by 2.8% per annum on average in both Europe and the Americas. The objective of this course is to introduce students to the history, market, production and end-uses of technical textiles. The students will get familiar with technical textiles yarns, fabrics, and processing. They will also study in detail major categories of technical textiles, viz. Mobiltech, Indutech, Hometech, Buildtech, Medtech, Agrotech, Clothtech, Sporttech, Geotech, Protech, Packtech and Oekotech.

### **TE – 573 Advanced Textile Process and Quality Control 3(3–0)**

This course introduces design, planning and control of capabilities and resources of a firm. The course aims at strengthening students' conceptual understanding and skills in the areas of operation, strategy and technology, forecasting, capacity and materials management and design of productive systems. Various quality management systems will be taught to the students.

### **TE – 574 Non-woven Textiles 3(3–0)**

Non-woven, unlike woven and knitted fabrics, are prepared directly from the fibre without the intermediate step of yarn formation. Non-woven fabrics are broadly defined as fibre sheets or web structures bonded together by entangling fibres mechanically, thermally or chemically. The world production of non-woven is forecasted to increase to the tune of 6.31 million tonnes in 2010, with a total value estimate of \$25 billion. Examples of non-woven include baby diapers, feminine hygiene products, adult incontinence products, wipes, bandages and wound dressings, isolation gowns, surgical gowns, surgical drapes and covers, surgical scrub suits, caps, gasoline, oil and air-filters, water, coffee and tea bags. The objective of this course is to introduce students to the history, market, production and end-uses of non-woven textiles. The students will get familiar with non-woven raw materials and study in detail different non-woven technologies including web forming, web bonding and web enhancement methods.

### **TE – 575 Medical Textiles 3(3–0)**

World medical textile market is currently estimated to be worth more than \$8 billion. It is 6<sup>th</sup> in rank in the terms of volume and 7<sup>th</sup> rank in terms of value among the 12 major categories of technical textiles. Medical textiles have a strong growth potential in developed countries based on an ageing, longer-living and more affluent population that has an increased interest in healthcare issues.

The focus of this course is textiles used in medicine and healthcare, including products like medical absorbents, bandages, dressing for wound-care, protective eye pads, wipes, surgical gowns, intelligent medical textiles, artificial kidneys, artificial livers, artificial heart and mechanical lungs, etc

### **TE – 671 Textile Composites 3(3–0)**

Composites are the materials of 21<sup>st</sup> century. They have vast applications in sports, defense, automotive, aerospace engineering, medical sciences, building/construction material, carpet recycling and many other sectors.

This course is designed to provide student thorough knowledge of fundamental issues of fibres reinforced composites. Students will develop the understanding how composites are made from different fibres and how the inherent properties and layout of fibres affect the mechanical behaviour of composites. They will also learn the techniques used to characterize the structure and properties of composites materials. They will also gain the practical experience of making fibre reinforced composites and characterize their behaviour through mechanical properties.

### **RM – 571 Research Methodology 3(3–0)**

This course introduces the mathematical and statistical techniques applicable for the design and analysis of results of engineering experiments..

### **RM – 671 Analytical techniques 3(3–0)**

The balance of the course is an introduction to different analytical techniques involving advanced instruments. Students will discover how chromatographs purify and quantify unknown samples of textile and other materials and how the techniques of infrared

spectroscopy, UV/V is spectroscopy, and Mass Spectrometry are used to identify and quantitate materials in these samples. Additionally, participants will learn how to perform elemental analyses via Atomic Absorption Spectroscopy. The course wraps up with strategies for choosing the right technique for a given analysis. At the end student will also learn how to analyze the morphological details of the materials using SEM (scanning electron microscopy) and TEM (transmission electron microscopy) techniques.

## **TE – 679 Research Project 6(0 18)**

The Research Project module will enable participants to bring together the knowledge and skills acquired in the earlier modules to investigate a selected topic reviewing the literature, presenting seminars and preparing material in the form of a publication. The project will demonstrate the student's capabilities to perform independent but supervised research to solve practical problems utilising the theoretical knowledge and analytical skills attained. The overall purpose of the module is to develop in the participant an understanding of the steps involved in planning and conducting a research project and in communicating the findings both orally and in writing. The research projects will be allotted to the students after the approval by the Research Committee.

# **11. Contacts**

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