Instructor: P. Banks-Lee
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Office Hours: Wednesday 2:00-4:00, or by appointment

**Course Objectives**

- To build on the understanding developed in earlier courses and to provide the student with a better knowledge of yarn formation and properties.
- To teach the operating principles of equipment used in the various methods of producing yarns.
- To explain in-depth the interaction between processing parameters and fiber properties and how this interaction influences yarn properties.
- To give students a hands-on experience with making yarns and assessing yarn quality.

**Student Learning Objectives**

Students successfully completing this course will be able to:

- Discuss the different methods of producing staple yarns.
- Identify various equipment parts and discuss their function in the overall operating process.
- Discuss fiber/equipment interactions and relate these interactions to critical yarn properties.
- Evaluate the usefulness of new equipment.
- Produce and evaluate various types of staple yarns.

**Prerequisites/co-requisites**

The prerequisites for this class are TT 221 (Yarn Production and Properties I). Students should also have completed co-requisites for TT 221 which are MA 131 or MA 141 (Calculus I), and PY 211 or PY 205 (College Physics I).
Students not fulfilling the pre/co-requisites should see the instructor at the conclusion of the first class period. It is the student’s responsibility to satisfy course prerequisites, or to obtain permission to take the course without the necessary prerequisites.

Text:

There is no required textbook for this course. However, a course pack for TT 321 should be purchased from the Century Store. Course pack cost is less than $25.00.

**Reference materials** *(This material is on reserve in the Burlington Textile Library.)*


**GRADING POLICY**

- The final grade will be based on quizzes, homework, a group project, final exam and the laboratory grade.
  - Three Major Tests will account for 50% of the final grade
  - The Laboratory will account for 25% of the final grade.
  - Final exam will be 25% of final grade. (The final exam is comprehensive.)

- See Welcome Memo for quiz dates. (Dates of quizzes may change but adequate notice will be given).

- **Academic Integrity**

  Students are required to follow the University Code of Honor/Integrity. Note that your signature on any test or assignment will be viewed as your indication that you have neither given nor received unauthorized assistance. Please check the University Policy at: [http://www2.ncsu.edu/prr/student_services/student_conduct/POL445.00.1.htm](http://www2.ncsu.edu/prr/student_services/student_conduct/POL445.00.1.htm)
### Grading Scheme:

<table>
<thead>
<tr>
<th>Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>97 to 100</td>
<td>A+</td>
<td>87 to 89.99</td>
<td>B+</td>
<td>77 to 79.99</td>
<td>C+</td>
<td>67 to 69.99</td>
<td>D+</td>
</tr>
<tr>
<td>94.0 to 96.99</td>
<td>A</td>
<td>84.0 to 86.99</td>
<td>B</td>
<td>74.0 to 76.99</td>
<td>C</td>
<td>64.0 to 66.99</td>
<td>D</td>
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<tr>
<td>90.0 to 93.99</td>
<td>A-</td>
<td>80.0 to 83.99</td>
<td>B-</td>
<td>70.0 to 73.99</td>
<td>C-</td>
<td>60.0 to 63.99</td>
<td>D-</td>
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Students earning less than 60 will fail the class.
<table>
<thead>
<tr>
<th>Lecture Number</th>
<th>Activity</th>
<th>Reference Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction and class format</td>
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</table>
| 2              | Review of general principles of staple spinning | Lord – Chapters 1, 2, 4, 5, 25 and 26  
McCreight – Chapter 1, 2, and 12 |
| 3              | Review of general principles of staple spinning |                                                       |
| 4              | Blowroom (short staple)                      | Lord – Chapter 11  
McCreight – Chapter 3 and 4 |
| 5              | Blowroom (short staple, long staple)         |                                                       |
| 6              | Blowroom (long staple)                       |                                                       |
| 7              | Carding (short staple)                       |                                                       |
| 8              | Carding (short Staple)                       | Lord – Chapter 11  
McCreight – Chapter 5 |
| 9              | Review for Test 1                            |                                                       |
|                | Quiz 1                                       |                                                       |
| 10             | Carding (long staple)                        |                                                       |
| 11             | Cotton Incorporated Video                    |                                                       |
| 12             | Carding Calculations                         |                                                       |
| 13             | Cotton Incorporated Video                    |                                                       |
| 14             | Drafting (short staple)                      | Lord – Chapters 6 and 12  
McCreight – Chapter 6 |
| 15             | Drafting (long staple)                       |                                                       |
| 16             | Combing (short staple)                       | Lord – Chapter 8 and 9                                |
| 17             | Combing (long staple)                        |                                                       |
| 18             | Roving                                       | Lord Chapter 12                                       |
| 19             | Roving and Rubbing                           | Lord – Chapter 12  
McCreight – Chapter 8 |
|                | Quiz 2                                       |                                                       |
| 20             | Spinning (short and long staple)             | Lord – Chapters 9 and 13  
McCreight – Chapter 9, 10 and 11 |
| 21             | Rotor spinning, mule spinning                | Trommer – Chapters 3 and 4                            |
| 22             | Jet spinning                                 |                                                       |
| 23             | Twisting, Winding and Plying                 |                                                       |
|                | Quiz 3                                       |                                                       |
|                | FINAL EXAM                                   |                                                       |
Project Description

Objectives:
1. To give you an opportunity to investigate the various uses of textile yarns and fibers in non-apparel (non-traditional) applications.
2. To give you an opportunity to work in groups and thus improve your team working skills.
3. To allow you to work on your presentation skills.

The class will be divided into 3 or 4 member groups. Each group will be assigned the task of investigating fibers and yarns used in one of the following end uses:
1. Medical Textiles
2. Transportation Textiles
3. Sports Equipment
4. Military Applications
5. Geotextiles
6. Sports Apparel
7. Other (Your suggestion, with my approval).

You should present fibers and yarns used in at least 6 different products, making sure to pick a diverse range of products. Though you may find it easier to discuss fabrics used in particular applications, the assignment is to consider fibers and yarns not fabrics. Successful groups will present information on
1. Type of fiber used (Man-made or natural, short or long staple).
2. Fiber properties (Strength, modulus, fiber size, thermal properties, etc).
3. Type of yarns used (Filament or staple, textured or non-textured, etc.).
4. Yarn production method (Short or long staple processing, carded or combed yarn systems, Ring or open end yarns, etc).
5. Required yarn properties (Strength, modulus, yarn size, etc).
6. Other relevant facts (Special finishes, plying, or cabling).

Each group should prepare a 20 minute Powerpoint presentation. During the oral presentation each member of the group must present.

Be creative and think outside of the box. You may bring examples of products or yarns to show during your presentation. Make it exciting but also informative.

Project grades will be determined based on 60% of my assessment, 25% team member assessment and 15% peer (class) assessment. (See attached assessment forms.)