ECE469S: Optical Communications and Networks (2017)
Course website: https://portal.utoronto.ca/

Overview
This course provides an introduction to optical communication links and systems. We will begin with the basic principles of optical transmission and the operation of components used in optical networks. We will then describe the design and performance issues of optical communication links and systems.

Lectures
Monday, 2:00 - 3:00 pm, BA1240
Wednesday, 2:00 - 3:00 pm, BA1240
Thursday, 2:00 - 3:00 pm, BA1240

Tutorials
TUT0101: Wednesday, 5:00 - 6:00 pm, WB144 (starts on Jan. 18, 2017)
TUT0102: Friday, 9:00 - 10:00 am, WB144 (starts on Jan. 20, 2017)

Labs
PRA0101: Friday, 3:00 pm - 6:00 pm (odd weeks)
PRA0102: Friday, 3:00 pm - 6:00 pm (even weeks)
PRA0103: Monday, 9:00 am - 12:00 pm (odd weeks)
PRA0105: Tuesday, 3:00 pm - 6:00 pm (odd weeks)
PRA0106: Tuesday, 3:00 pm - 6:00 pm (even weeks)
PRA0107: Friday: 12:00 pm - 3:00 pm (odd weeks)
All labs are held in SF2112. Please see lab guide for dates.

Instructor
Prof. Joyce Poon, joyce.poon@utoronto.ca
Office Hours: Mon. and Wed., 3:00 - 4:00 pm, GB444A

Teaching Assistants
Foad Arvani foad.arvani@isl.utoronto.ca Tutorials
Antoine Bois antoine.bois@mail.utoronto.ca Labs 3, 4
Raj Ravichandiran rajsrimman.ravichandiran@mail.utoronto.ca Labs 5, 6
Zheng Yong zheng.yong@mail.utoronto.ca Labs 1, 2; head TA

Office Hours: by appointment

Grading
Labs\(\d\): 25%
Tests (2): 35% (closed book)
Final exam: 40% (Type: X, Calculator: Type 2)
\(\d\)Lab reports are due 1 week after the lab to the TA for the lab. Late reports are penalized at 20% per week day. Please refer to the lab guidelines for details.

Tests
Test 1: Thursday, Feb. 16, GB 304, 2:10 - 3:00 pm
Test 2: Thursday, Mar. 23, GB 304, 2:10 - 3:00 pm
Course Outline

*Timeline is approximate.*

1. Introduction (1 week)
   - Overview of optical communication links and networks
2. Optical fibres (2.5 weeks)
   - Modes
   - Dispersion
   - Nonlinearities
3. Transmitters (1.5 weeks)
   - Semiconductor lasers vs. LEDs
   - Optical modulators
4. Other components (1 week)
   - Couplers, gratings, wavelength (de)multiplexers, isolators, switches
   - Fibre amplifiers
5. Receivers (1 week)
   - Photodetectors
6. Optical communication links (3 weeks)
   - Receiver noise
   - Eye diagrams, bit error rates
   - Penalties, sensitivities
   - Direct vs. coherent detection
   - Modulation formats, spectral efficiency
7. Optical communication networks (3 weeks)
   - Lightwave systems, WDM
   - Loss/gain and dispersion limitations
   - Rise time and power budgets
   - Network topologies
   - Wavelength routing and assignment
   - Network hierarchies and protocols

References

### January

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **8th**: First lecture
- **15th**: Optical fibres
- **22nd**: P3-Lab1
- **29th**: P6-Lab2

### February

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **5th**: P3-Lab2
- **12th**: Other comp.
- **19th**: Reading Week
- **26th**: Receivers P3-Lab3

### March

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

- **5th**: P6-Lab4
- **12th**: P3-Lab4
- **19th**: Test 2
- **26th**: Network P3-Lab5

### April

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

- **9th**: P6-Lab6
- **9th**: P5-Lab6
- **16th**: Good Friday
- **23/30**: P2-Lab6

---

**Note:**
- **Sunday**: Links
- **Monday**: P1, P7-Lab4
- **Tuesday**: P2-Lab4
- **Wednesday**: P1, P7-Lab5
- **Thursday**: Test 2
- **Friday**: P2-Lab5
- **Saturday**: P1, P7-Lab6