# Graduate Programs—NEW COURSE PROPOSAL

**Department:** Department of Computer & Electrical Engineering and Computer Science  
**College:** Engineering and Computer Science

**Recommended Course Identification:**

Prefix: CTS  
Course Number: 6319  
Lab Code (L or C):  
(TO OBTAIN A COURSE NUMBER, CONTACT MIGUEL@FAU.EDU)

**Complete Course Title:** Cyber Security: Measurement and Data Analysis

**Effective Date:** Spring 2016

**Credits:** 3

**Textbook Information:**

- Required:
  - Research Papers from the cyber security community will be supplied and required.

**Grading (Select only one grading option):** Regular X Satisfactory/Unsatisfactory

**Course Description:**

This course explores techniques and considerations for conducting cyber security research rooted in empirical observation. Topics include Internet measurement methodologies and data analytics for inferring and characterizing cyber attacks. The ultimate goal of this course is to foster analysis of empirical data that is both sound and insightful.

**Prerequisites:**

- Graduate level status or permission of the instructor

**Corequisites:**

**Registration Controls (Major, College, Level):**

- *Prerequisites, corequisites, and registration controls will be enforced for all course sections.

**Minimum Qualifications Needed to Teach This Course:**

Member of the graduate faculty of FAU and has a terminal degree in the subject area (or a closely related field)

Faculty contact, email and complete phone number: Nurgun Erdol, erdol@fau.edu, 561-297-3499

Please consult and list departments that might be affected by the new course and attach comments. Mathematical Sciences (College of Science)

**Approved by:**

Department Chair: [Signature]
College Curriculum Chair: [Signature]
College Dean: [Signature]
UGPC Chair: [Signature]
Graduate College Dean: [Signature]
UFS President: [Signature]
Provisor: [Signature]

**Date:** 10/3/2015

**Email this form and syllabus to UGPC@fau.edu one week before the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.**

FAUniverseGrad Revised November 2014
1. Course title/number, number of credit hours

| Cyber Security: Measurement and Data Analysis | 3 credit hours |
| CTS 6319 |

2. Course prerequisites, corequisites, and where the course fits in the program of study

Prerequisites: Graduate level status or permission of the instructor

3. Course logistics

Term: Spring 2016  
Class location and time: TBA

4. Instructor contact information

| Instructor's name               | Dr. Nurgun Erdol  |
| Office address                 | Engineering East Building, Room 403A |
| Office Hours                   | TBA |
| Contact telephone number       | 561-297-3409 |
| Email address                  | erdol@fau.edu |

5. TA contact information

| TA's name                      | TBA |
| Office address                 | |
| Office Hours                   | |
| Contact telephone number       | |
| Email address                  | |

6. Course description

This course explores techniques and considerations for conducting cyber security research rooted in empirical observation. Topics include Internet measurement methodologies and data analytics for inferring and characterizing cyber attacks. The ultimate goal of this course is to foster analysis of empirical data that is both sound and insightful. This course introduces data science to the field of cyber security. Digital investigation approaches for cyber security will be discussed. Further, data analytics and traffic analysis methodologies will be presented. Data acquisition and sound analysis methods will also be elaborated. Approaches for inferring and attributing various types of cyber attacks will be presented.

7. Course objectives/student learning outcomes/program outcomes

| Course objectives | 1. Provide a background of networking concepts and how they can be leveraged in cyber security |
|                  | 2. Provide practical and sound methods for the acquisition and measurement of Internet traffic for cyber security |
|                  | 3. Demonstrate real corporate and Internet attacks |
|                  | 4. Compare and contrast probabilistic, statistical and heuristical approaches to infer and attribute cyber security attacks through traffic analysis |
|                  | 5. Provides practical techniques to geolocate and report cyber security incidents |
|                  | Students will come away with applicable skills in employing data science techniques to infer, characterize, attribute and provide evidence of corporate |

Cyber Security: Measurement and Data Analysis
8. Course evaluation method

Assignments 40%
Project 40%
Project Presentation 10%
Active participation and research interest 10%

The project necessitates building a tool/system that achieves some cyber security goal. Examples: Building a tool to investigate and report on a rare malicious network activity or a tool to mine phishing emails to infer and label phishing campaigns.

9. Course grading scale

Grading Scale:

10. Policy on makeup tests, late work, and incompletes

Makeup exams are given only if there is solid evidence of a medical or otherwise serious emergency that prevents the student of participating in the exam. Makeup exams will be administered and proctored by department personnel unless there are other pre-approved arrangements.

A grade of incomplete will be assigned only in the case of solid evidence of medical or otherwise serious emergency situation.

Must turn in homework, reports and projects on time. One point per working day will be deducted from the late assignment. Will not accept your work after 3 working days or the solution has been provided.

11. Special course requirements

N/A

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.

14. Honor code policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with
### 15. Required texts/reading

Research Papers from the cyber security community will be supplied and required.

### 16. Supplementary/recommended readings


### 17. Course topical outline, including dates for exams/quizzes, papers, completion of reading

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Overview and Logistics</td>
<td>N/A</td>
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<td>Week 2</td>
<td>TCP/IP</td>
<td>N/A</td>
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<td>Week 3</td>
<td>Internet Measurement</td>
<td>Paper 1</td>
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<td>Week 4</td>
<td>Denial of Service</td>
<td>Paper 2</td>
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<tr>
<td>Week 5</td>
<td>Denial of Service (cont.) HW1 due</td>
<td>Paper 3</td>
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<td></td>
<td>Project Description</td>
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<td>Week 6</td>
<td>Denial of Service (cont.)</td>
<td>Paper 4</td>
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<tr>
<td>Week 7</td>
<td>Probing</td>
<td>Paper 5</td>
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<tr>
<td>Week 8</td>
<td>Botnets HW2 due</td>
<td>Paper 6</td>
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<td>Week 9</td>
<td>Network intrusion detection systems</td>
<td>Paper 7</td>
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<td>(NIDS)</td>
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<td>Week 10</td>
<td>NIDS Issues HW3 Due</td>
<td>Paper 8</td>
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<td>Week 11</td>
<td>Spam</td>
<td>Paper 9</td>
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<td>Week 12</td>
<td>Censorship</td>
<td>Paper 10</td>
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<td>Week 13</td>
<td>Legality and Ethics HW4 due</td>
<td>Paper 11</td>
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<td>Week 14</td>
<td>Underground Economy</td>
<td>Project Presentations</td>
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<td>Project Presentations</td>
<td>N/A</td>
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<tr>
<td>Week 15</td>
<td></td>
<td>Project Presentations</td>
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<td>N/A</td>
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Research Papers

Paper 1:

Paper 2:

Paper 3:

Paper 4:

Paper 5:

Paper 6:

Paper 7:

Paper 8:

Paper 9:

Paper 10:

Paper 11:

Note: this list may be updated in the future.

Cyber Security: Measurement and Data Analysis
Re: Request for approval -- new courses

Rainer Steinwandt [srainer@math.fau.edu]

To: Mihaela Cardei
Cc: Yuan Wang, Nurgun Erdol

Good afternoon,

Thank you for your email. Both courses look very fine, and there are no objections from the Department of Mathematical Sciences.

Kind regards,
Rainer

From: "Mihaela Cardei" <mcardei@fau.edu>
To: "Rainer Steinwandt" <srainer@math.fau.edu>
Cc: "Yuan Wang" <YWANG@fau.edu>, "Nurgun Erdol" <erdol@fau.edu>
Sent: Monday, October 12, 2015 9:27:37 AM
Subject: Request for approval -- new courses

Dear Dr. Steinwandt,

The Department of Computer & Electrical Engineering and Computer Science (CEECS) is proposing 2 new courses:
- COT 6116 - Secret Sharing Protocols
- CTS 6310 - Cyber Security: Measurement and Data Analysis

Please find attached the syllabi and cover pages.

We need your approval that the Department of Mathematical Sciences supports these course proposals. Could you please review the material and email me your approval decision?

Thank you,

Mihaela Cardei, PhD
Professor
Computer & Electrical Engineering and Computer Science Department
College of Engineering and Computer Science
Florida Atlantic University
http://www.cse.fau.edu/~mhaela