1. **Course number and title:** CS685A Network Management

2. **Instructor’s name:** Dr. Vladimir V. Riabov, Associate Professor; Office: STH-312; Tel: (603) 897-8613; E-mail: vriabov@rivier.edu; Web site: http://www.rivier.edu/faculty/vriabov/

3. **Course description:** A survey of evolution of a network and the technologies available for network planning, creation, and operation. Topics include: operations, administration, maintenance, management of the configuration, database, security, and modeling techniques with OPNET software. 

   **Prerequisite:** CS573 Advanced Wide Area Networks, or equivalent (CS575 Advanced Local Area Networks or CS553 Introduction to Networking Technologies).

4. **Course objectives:**

   The task of managing networks, computer systems, and business applications has become of paramount importance for the following reasons: (i) the enormous advancements in networking technology in recent years, (ii) the increasing dependence of human activities on networks and computers, and (iii) the commercialization of information technology (IT) services (e.g. email and electronic commerce). This course focuses on practices, standards, and open issues regarding the management of networks, computers that are connected to networks, and business applications that reside on the computers. The course examines both theoretical and practical issues in the field of network management.

   Upon completion of this course, the student should learn:

   - Standards and Models of Network Management
   - TCP/IP and other networking protocols related to Network Management
   - The Internet Organizations and some RFC Publications
   - SNMPv1 Management issues: Organization and Information Models, and Communication and Functional Models
   - SNMP Network Management issues resolved by SNMPv2, SNMPv3, and RMON
   - LAN Systems (Ethernet, CSMA/CD, Token Ring, FDDI, Fiber Channel, Wireless LANs)
   - Broadband technologies (ISDN, ADSN, xDSL, and cable modem)
   - Broadband Network Management issues in ATM Networks and Access Networks
   - Wide-Area Networks (Circuit-Switching, Packet-Switching, Frame Relay, ATM)
   - Internetworking Protocols (IPv4, IPv6, ICMP, IGMP)
   - Routing Strategies and Protocols
   - Storage Area Networks
   - Telecommunications Network Management
   - Modern Network Management Tools and Systems
   - Various Network Management Applications (SMTP, FTP, TELNET, HTTP, and others)
   - Network Security (Encryption, Digital Signature, IPSec)
   - Networking simulation and modeling techniques with OPNET software.

5. **Class Dates and Time:** September 13, 2005 – December 13, 2005  
   Tuesdays: 5:30 PM - 7:30 PM


7. **Recommended books:**


**Partial List of Excellent Reference Sources for Classes and Project Assignments:**

- Integrated Management (IEEE Publishing, 1999-present);
- Network Operations and Management Symposium (IEEE Publishing, 2000-present);
- IEEE Communications Magazine (technical journal);
- IEEE Journal on Selected Areas in Communications (technical journal);
- IEEE Network (technical journal);
- IEEE Spectrum (technical journal);
- IEEE Transactions on Communications (technical journal);
- Computer Communications (technical journal);
- Computer Networks and ISDN Systems (technical journal);
- Bell System Technical Journal;
8. Classroom Policies:
   a) Attendance: As college students, it is your responsibility to be present for lectures. Missed notes, etc. are also your responsibility. Not attending class more than two times may result in a reduction of your grade, unless prior permission is received from the instructor. Please notify me of extenuating circumstances.
   b) Project Assignment (individual project): The project can be either (i) an implementation exercise (related to Network Management) using the OPNET software (or any other software, e.g., Spectrum, OMnet++, etc.) or (ii) a paper on an important topic in network management. The purpose of implementing the software exercise or writing the paper is for you to gain an in-depth understanding of a particular topic that you are interested, or the technical knowledge that you learned will benefit you for your work or for your career development. It also gives you an opportunity to learn how to do independent research work, develop a study case, as well as how to write a technical report/paper.

The potential topics for your paper or software exercise in network management are listed as follows:
   - Policy-based management;
   - Web-based management;
   - Quality of Service (QoS) management;
   - Response time management;
   - Broadband technologies, multimedia applications, and related network management issues;
   - Service level management;
   - Event correlation;
   - Differences between SNMPv1, SNMPv2, and SNMPv3;
   - Internet2;
   - IPv6 and SNMP;
   - A topic of your own selection (may be related to your work).

The paper should consist of about 15 typed pages plus illustrations, bibliography, and appendices (if necessary). A minimum of six technical articles and/or books must be used as sources for your paper. At least thirty percent of your reference materials should be technical articles published within two years.

You must submit your outline by and discuss it with me before you start writing the paper or start your project. If you need advice regarding the topic to select, the format of the paper, the contents of the paper, or reference material, you should discuss it with me. Discussing the same with your classmates is also encouraged. The outline discussion process is very important, because, only through this process, I may help you to organize your paper, advise you on the contents of the paper, advise you on where to find references, and guide you to the right direction. A student should make the project presentation at the end of the semester (see the course schedule). The Project Paper is due on December 6, 2005.

c) FOUR homework assignments are scheduled (September 27, October 11, November 8, and November 29).

d) FOUR in-class labs are scheduled (September 20, October 4, November 1, and November 15).

9. Evaluation Mechanism:
Students are required to pass all exams and complete all assignments. Exams will be based on textbooks, lecture material, and handouts. All exams will be comprehensive, closed book and open notes, and will be conducted in-class. See “Project Assignments” for detailed project assignment requirements. Grades for all exams and assignments will not be determined by curves. Letter grades submitted to the Registrar’s Office would be based on the Rivier College Grading system. The conversion from numerical grade to letter grade will be based on the following table:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Honor Points</th>
<th>Numerical Grade</th>
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<tbody>
<tr>
<td>A</td>
<td>4.0</td>
<td>94-100</td>
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<tr>
<td>AB</td>
<td>3.5</td>
<td>90-93</td>
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<tr>
<td>B</td>
<td>3.0</td>
<td>84-89</td>
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<tr>
<td>BC</td>
<td>2.5</td>
<td>80-83</td>
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<td>C</td>
<td>2.0</td>
<td>73-79</td>
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<tr>
<td>F</td>
<td>0.0</td>
<td>Below 73</td>
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The grade is made up of your performance on your homeworks, labs, project, midterm and final exams. Approximate weightings are as follows:

- Homeworks: 10%
- Labs: 10%
- Midterm Exam: 25%
- Final Exam: 25%
- Project & Presentation: 30%

10. Due Dates:

- Homeworks #1-4 due: September 27, October 11, November 8, and November 29, 2005
- Labs #1-4 (in-class) due: September 20, October 4, November 1, and November 15, 2005
- Project Proposal: October 11, 2005
- Midterm Exam: October 18, 2005
- Project presentation: November 29 or December 6, 2005
- Project paper due: December 6, 2005
- Final Exam: December 13, 2005

11. Topic Outline:

<table>
<thead>
<tr>
<th>SESSION</th>
<th>TOPIC</th>
<th>READING</th>
<th>HOMEWORKS</th>
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<tbody>
<tr>
<td>1</td>
<td>(09/13) Data Communications and Network Management Overview. Lab00.</td>
<td>Ch. 1</td>
<td>OPNET</td>
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<tr>
<td>2</td>
<td>(09/20) Review of Computer Network Technologies. Lab01.</td>
<td>Ch. 2</td>
<td>In-class Lab01 due</td>
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<td>3</td>
<td>(09/27) Standards, Models, and Language. SNMPv1 Network Management:</td>
<td>Ch. 3</td>
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<td>Organization and Information Models</td>
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<td>4</td>
<td>(10/04) SNMPv1 Network Management: Communication and Functional Models</td>
<td>Ch. 5</td>
<td>In-class Lab02 due</td>
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<td>(10/11) SNMP Management: SNMPv2. SNMP Management: SNMPv3.</td>
<td>Ch. 6</td>
<td>Homework #2 due</td>
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<td>[PROJECT PROPOSAL DUE]</td>
<td>Ch. 7</td>
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<td>6</td>
<td>(10/18) [MID-TERM EXAM]</td>
<td>[MID-TERM EXAM] Chs. 1-7</td>
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<td>(10/25) SNMP Management: RMON. Broadband Network Management: ATM Networks.</td>
<td>Ch. 8</td>
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<td>(11/01) Broadband Network Management: Access Networks. Lab03.</td>
<td>Ch. 10</td>
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<td>9</td>
<td>(11/08) Telecommunications Network Management. Network Management Tools and Systems.</td>
<td>Ch. 11</td>
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<td>10</td>
<td>(11/15) Network Management Applications. Lab04.</td>
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<td>In-class Lab04 due</td>
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<td>SESSION</td>
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<td>11 (11/22)</td>
<td>Web-Based Management.</td>
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<td>12 (11/29)</td>
<td>Project Presentations</td>
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<td>Homework #4 due</td>
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<td>13 (12/06)</td>
<td>Project Presentations</td>
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<td>14 (12/13)</td>
<td>[FINAL EXAM]</td>
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