Carroll University – MSPAS Program  
PHA 513: Evidence Based Medicine and Research  
May – 2017

Course Number:  
Physician Assistant 513

Course Title:  
Evidence Based Medicine and Research

Number of Credits:  
2 Credit Hours

Day/Time:  
Schedule varies  
See Course Calendar for specific information (Appendix A, pp. 8-9)

Prerequisites:  
Successful Completion of Courses in the Spring Term

Faculty:  
Karen Graham, PhD, PA-C  
Email preferred: kgraham@uwlax.edu  
Emails will be answered daily Mon-Fri during May term  
608-406-5658 for emergencies  
Office Hours via Skype or phone by appointment

Course Description:  
This course presents a review of basic statistics and its application to evidence-based theory as it pertains to epidemiology, public health, and the practice of clinical medicine. Modules in accessing computer based medically oriented information and medical data bases are presented. The course emphasizes the use of literature to validate and improve the practice of clinical medicine. Students identify, review, and critique published literature relevant to clinical settings. Students learn to use medical literature as a tool in clinical decision-making.

Course Content:  
This course presents a systematic approach to the development of literacy in clinical practice by providing a framework for self-directed inquiry and lifelong learning. Students learn to develop answerable clinical questions and then to use the best evidence by searching out relevant medical literature, interpreting the literature through a basic knowledge of study design and medical statistics, critically examining the literature, and applying findings to individualized patient care.

Readings and Resources:  
No textbook recommended or required for this course. Required and supplemental readings will be posted on the LMS course site.

Writing:  
All submitted work should be checked for grammar and spelling accuracy. References/citations should be in AMA (American Medical Association) format.
**Student Expectations:**

- Demonstrates a positive attitude toward learning
- Is on time for all scheduled classes, including timely return from breaks
- Completes readings and assignments prior to class
- Asks relevant and understandable questions
- Takes full responsibility for learning and self-directed learning activities
- Shows respect for self, other students, and faculty
- Refrains from revealing negative feelings through tone of voice or body language
- Refrains from disruptive activities during class including eating, talking, getting up and down, use of cell phone, etc.
- Relies on personal resources before approaching others for help
- Demonstrates cooperation with and mutual respect for peers
- Responds to faculty, staff and peers readily and appropriately

**Instructor Expectations:**

- Demonstrates a positive attitude towards the facilitation of learning
- Is on time for all scheduled classes
- Should the need arise, reschedules class time with appropriate and timely notification to students, faculty, and staff
- Provides appropriate course materials for class preparation prior to class
- Is available for office hours or appointments to assist with questions; responds to faculty, staff, and students readily and appropriately
- Listens attentively and initiates communication which is appropriate and timely
- Identifies limitations in knowledge and provides appropriate resources for student learning
- Provides timely and constructive feedback for assignments and assessments
- Shows respect for self, students, and other faculty
- Refrains from revealing negative feelings through tone of voice or body language
- Demonstrates cooperation with and mutual respect for students, faculty, and staff

**Student Responsibilities:**

1. Comes to every class prepared by reading all required readings and watching all scheduled podcasts before the scheduled class time. **Participation** in class discussions is vital for professional development and active learning of the concepts in this course. Therefore, participation in class discussions will be graded according to the rubric in Appendix B of this syllabus (p.10).
2. Completes the **Stats Self-Study Worksheet**, a review of basic statistic and study design terminology, outside of class at the beginning of the course (available on the LMS under Assignments). Some, if not most of this worksheet should be a review from undergraduate statistics. A list of resources that may be used in completing this worksheet is hyperlinked on the assignment, as well as here. The Medical Statistics and Study Design podcasts will also be helpful. The terminology on this worksheet is foundational for the remainder of the course and for your capstone project.
3. Completes the **Clinical Questions Worksheet** (available on the LMS under Assignments) to gain additional practice formulating clinical questions.
4. Develops 2 **Original Clinical Questions** based on shadowing, practicum, or didactic experiences. See Appendices C and D of this syllabus for instructions and examples (pp. 11-13).

5. Completes 2 **Information Literacy Tasks** that require application of course concepts, including extraction and interpretation of pertinent information from research articles. These will be available on the LMS under Assignments.

6. Meets with an assigned group to critique articles from the medical literature and share with the instructor by the due date. The **Group Article Critique** grade will take into account the accuracy and thoroughness of the critique worksheet (group grade) and an individual peer evaluation of participation score. Peer evaluations within the groups will be anonymous and will be completed at the end of the course. See Appendices E& F (pp. 14-15) for group and peer evaluation criteria. Articles and worksheets will be posted on the LMS under Course Documents & Resources.

7. Because there are no exams or quizzes in this course, learning is demonstrated by the application of course concepts to complete the required activities above. Therefore, remediation is required for any course requirement for which the student receives <70%. All course assignments and remediations must be complete to receive a grade for the course, however remediation will not improve the course grade.

8. Two points will be deducted from any assignment for each day that it is late. Students who are ill on a day that an assignment is due need to contact the instructor as soon as possible.

**Assessment:**

**Grading System:**

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Linked to Learning Outcome #</th>
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<tbody>
<tr>
<td>Participation</td>
<td>5 points</td>
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<tr>
<td>Stats Self-Study Worksheet</td>
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<tr>
<td>Clinical Questions Worksheet</td>
<td>5 points</td>
</tr>
<tr>
<td>Original Clinical Questions</td>
<td>10 points</td>
</tr>
<tr>
<td>Information Literacy Task #1</td>
<td>10 points</td>
</tr>
<tr>
<td>Information Literacy Task #2</td>
<td>20 points</td>
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<tr>
<td>Group Article Critiques (all)</td>
<td>35 points</td>
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<tr>
<td>Total Points Possible</td>
<td>100 points</td>
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**Letter Conversion Scale**

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<tr>
<td>A</td>
<td>100-93</td>
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<tr>
<td>AB</td>
<td>92.99-90</td>
</tr>
<tr>
<td>B</td>
<td>89.99-83</td>
</tr>
<tr>
<td>BC</td>
<td>82.99-80</td>
</tr>
<tr>
<td>C</td>
<td>79.99-70</td>
</tr>
<tr>
<td>D</td>
<td>69.99-60</td>
</tr>
<tr>
<td>F</td>
<td>59.99 and below</td>
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</tbody>
</table>
Final Exam:
There are no exams in this course. In lieu of a final exam, Information Literacy Task #2 and Original Clinical Questions are due by 10:00 pm on Wednesday, May 31.

Groups:

**Group A**: Teats, Schwab, Schenzel, Hass, Forbes, Martin  
**Group B**: Vanderpool, Held, Kraus, Reil, Bresser, Campos  
**Group C**: Schalmo, Stadler, Hannah, Phearman, Garnett  
**Group D**: Simones, Singh, Korn, Gedde, Henderson

Program/University Policy Statements

**Attendance and Professionalism** - Attendance at all class periods, laboratories, and practical experiences are mandatory unless otherwise indicated. Poor attendance (unexcused absences, tardiness, and unauthorized early departures), lack of preparation, and unprofessional behavior may result in a lower or failing grade and/or be reported to the program progression committee. If you will be absent, tardy, or need to be excused early you must notify the course director via e-mail or phone prior to the scheduled meeting time. Tardiness and unauthorized early departures will be considered unexcused absences unless prior notification is submitted. Unexcused absences of more than 10% of class time may result in a failing grade. Absences are excused only at the discretion of the course director and/or the PA Program Director. Students may be required to make up missed laboratory time (excused or unexcused) at the discretion of the course director.

**Statement on Academic Integrity** - The Carroll University Academic Integrity Policy is located in the Carroll University Student Handbook. Students are encouraged to familiarize themselves with it. If a student violates this policy in any way, the instructor(s) reserve the right to impose a sanction of failure on the assignment/assessment or failure in the course. If you have questions about appropriate citations, please ask your instructor.

**Accommodation for Disabilities** - Any requests for accommodation for physical or cognitive disability must be made through the Walter Young Disability Services Coordinator at Carroll University. Appropriate accommodations will be evaluated based on the program technical standards once notification has been received from the Walter Young coordinator. If an individual student has special needs or concerns about course requirements related to religious beliefs, cultural issues, or other issues, the student must contact the Program Director with a request for accommodation.
**Modifications to the syllabus** - The instructor and the University reserves the rights to modify, amend, or change the syllabus (schedule, course requirements, grading policy, etc.) as the curriculum and/or program require(s).

**Remediation** - Students who receive a D or an F in this or any physician assistant year 1 course will be placed on academic probation.

During the course, a student who scores more than 2 SD below the mean on an exam/assessment may be required to complete additional work. The student will be contacted by the course instructor and asked to meet to discuss the remediation requirements for that particular assessment. Remediation requirements will be determined by the course instructor. When an instructor requires remediation of a student it does not affect the exam/assessment grade, nor does it improve the semester or course grade. Remediation is required to ensure that course objectives are met. It is expected that assigned work for the purpose of remediation be completed in a thorough, professional and timely manner. Satisfactory completion of remediated work will be determined by the course instructor. Students may be required to complete additional work if the original remediation is deemed unsatisfactory.

Students should make every effort to resolve remediation issues with the course director. If a student is unable to resolve such issues s/he may request a review by the Didactic Subcommittee. All decisions made by the subcommittee are final. If remediation is not successfully completed by the end of the course/semester a grade of “Incomplete” will be given until the work is successfully completed. Please note that an incomplete course grade may delay program progression and/or graduation. Information regarding incomplete grades is available in the Graduate Catalog.

**Course Goals:**

- Review research terminology and the interpretation of statistical tests commonly used in medical research
- Support the ongoing development of information literacy skills
- Provide a framework for literature evaluation in the program’s capstone project
- Provide a framework for evidence-based practice

**Learning Outcomes:**

*After completion of this course, the student should be able to:*

1. Describe evidence-based medicine and its application to individualized patient care
2. Interpret basic statistical terms used in medical research and describe the implications of these concepts for medical decision making
3. Calculate and interpret clinically applicable endpoints such as number needed to treat, sensitivity/specificity, and likelihood ratios
4. Compare and contrast the different types of study designs commonly used in medical research and describe advantages and disadvantages of each
5. Discriminate between levels of evidence and assign a level to specific articles
6. Recognize common sources of bias in medical research
7. Develop focused, answerable clinical questions using the “PICO” format in the domains of therapy, prognosis, diagnosis, or etiology
8. Actively and thoughtfully summarize and critically evaluate current medical literature with peers

Learning Objectives:

- Define evidence-based medicine
- Explain the rationale for evidence-based practice
- List the steps to evidence-based practice
- Distinguish between patient-oriented and disease-oriented outcomes
- Describe the importance of developing answerable clinical questions
- Differentiate between foreground questions and background questions
- Develop answerable clinical questions on therapy, diagnosis, prognosis, and etiology using the PICO format
- Interpret the following statistical terms in the medical literature and describe their significance: bias, confounding, prevalence, incidence, mean, median, sampling, hypothesis testing, test statistic, p values, confidence intervals, type I and type II error, power and power analysis, correlation and regression
- Differentiate between primary and secondary research
- Differentiate between observational and experimental research design
- Describe the hierarchy of evidence in medical research
- Compare and contrast the major study designs used in medical research and describe the pros and cons of each design
- Correlate clinical questions with the appropriate study design
- Assign a level of evidence to specific articles
- Differentiate between association and causation
- Define critical appraisal
- Describe the critical appraisal process
- Critically appraise articles about therapies from the medical literature for validity, importance, and relevance
- Interpret measures of therapy effect that are commonly used in the medical literature
- Calculate relative risk, relative risk reduction, absolute risk reduction, number needed to treat, and number needed to harm
- Discuss marketing strategies that pharmaceutical companies use to present medical research results
- Critically appraise articles about prognosis from the medical literature for validity, importance, and relevance
- Critically appraise articles about etiology/risk from the medical literature for validity, importance, and relevance
- Differentiate between relative risk, odds ratios, and hazard ratios
- Critically appraise articles about diagnostic tests from the medical literature for validity, importance, and relevance
- Define, calculate, and interpret: sensitivity, specificity, negative predictive value, and positive predictive value
- Discuss the effect (or lack of effect) of prevalence on sensitivity, specificity, negative predictive value, and positive predictive value
- Explain the meaning and uses of “SpPins” and “SnNouts”
• Define and interpret likelihood ratios
• Interpret number needed to screen and area under the curve values for receiver operating characteristics curves
• List and define types of secondary medical literature
• Identify the steps in creating a systematic review or meta-analysis
• Critically appraise systematic reviews and meta-analyses for validity, importance, and relevance
• Interpret Forest plots
• Locate and apply evidence-based clinical practice guidelines to individual patient care.
• Recognize how clinical practice guidelines are graded.
Appendix A: Course Calendar

*Assignments to be submitted can be located on the LMS under “Assignments.” All readings are posted on the LMS under Course Documents & Resources/Readings. All seminar handouts (slides) and other documents that you will need for the Seminar Days will be posted on the LMS under Course Documents & Resources/Handouts.

**Podcasts can be accessed via this Google Drive folder or this Dropbox folder. These links are also on the LMS homepage. Handouts (slides) for the podcasts are posted on the LMS under Course Documents/Handouts. Podcasts from Google Drive can be viewed within your web browser (works best with Chrome), and you can even change the speed of play in the settings. Alternatively, you can download the podcasts to your device (arrow or download button in upper right hand corner of the screen). In Dropbox, only a preview of the podcast will play within the dropbox site, so you need to download the podcasts to your device to watch (download button upper right hand corner of the screen).

<table>
<thead>
<tr>
<th>Due Dates &amp; Seminar Times</th>
<th>*Assignments &amp; Seminar Topics</th>
<th>Done</th>
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<tbody>
<tr>
<td>By 5/12 at 10:00 pm</td>
<td>Read instructor’s introductory email (you will receive by 8:00 am on Thursday, May 11). Complete the required readings “Making EBM doable in everyday practice” and “How to answer your clinical questions more efficiently,” review this syllabus, and then send a reply to the instructor.</td>
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<tr>
<td>By 5/16 at 9:30 am</td>
<td><strong>Podcasts:</strong> Medical Statistics, parts I-V (about 1 hour total) Study Designs, parts I &amp; II (about 1 hour total) <em>Be prepared to answer questions and build on this content in the seminar,</em> [OPTIONAL] What causes what? podcast from Planet Money – <em>listen at least through 7:05</em> Submit Stats Self-Study Worksheet</td>
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Seminar Day 1

<table>
<thead>
<tr>
<th>5/16, 9:30 am – 5:30 pm</th>
<th>Intro to EBM and PHA 513</th>
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<tbody>
<tr>
<td></td>
<td>Intro to POEMs</td>
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<td>Formulating Clinical Questions</td>
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<td></td>
<td>Practice writing clinical questions</td>
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<td></td>
<td>Study Designs Wrap-up</td>
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<td></td>
<td>Practice identifying study designs</td>
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<td>Therapy Article Appraisal</td>
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<td></td>
<td>Practice calculating NNT</td>
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<tr>
<td></td>
<td>POEM Discussion</td>
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In the Interim

| By 5/19, 10:00 pm       | Submit Clinical Questions Worksheet                                                       |                   |
| By 5/19, 10:00 pm       | Complete Diagnostic Statistics pre-quiz & check answers (this will not be submitted to instructor), located on the LMS under Course Documents & Resources/Handouts. |                   |
| 5/22, 1:00-2:00 pm      | Instructor immediately available for questions via phone, Skype, or email                  |                   |
| By 5/22, 10:00 pm       | **Podcasts:** Diagnostic Article Appraisal (about 30 min total) Diagnostic Statistics (about 30 min total) if needed |                   |
### Seminar Day 1
**5/23, 1:00-3:00 pm**
Instructor immediately available for questions via phone, Skype, or email

**By 5/23 at 10:00 pm**
Share GROUP Therapy Article Critique with instructor

**By 5/24 at 10:00 pm**
Submit Information Literacy Task #1

**By 5/26 at 9:30 am**
*Podcast:
Prognosis/Etiology Article Appraisal (about 36 minutes)
Systematic Review/Meta-Analysis Article Appraisal, parts I and II (about 45 minutes)
*Be prepared to answer questions and build on this content in the seminar.*

**By 5/26 at 9:30 am**
Read posted article “Papers that report drug trials” and be prepared to discuss in the seminar

**By 5/26 at 9:30 am**
Read posted article “How to read a systematic review and meta-analysis and apply the results to patient care” and be prepared to discuss in the seminar

**By 5/26 at 9:30 am**
Read posted article for Group Prognosis/Etiology Article Critique

### Seminar Day 2
**5/16, 9:30 am – 5:30 pm**
Pharmaceutical Marketing vs. Evidence

- Wrap-up of Diagnostic Article Appraisal, Prognosis/Etiology Article Appraisal, and Systematic Review/Meta-Analysis Appraisal
- Group Prognosis/Etiology Article Critique
- POEM Discussion
- Review and Wrap-up

### Post-Seminar
**By 5/30, 10:00 pm**
Share GROUP Systematic Review/Meta-Analysis Critique with instructor

**By 5/31, 10:00 pm**
*Podcast:
Clinical Practice Guidelines, parts I and II (about 30 minutes); email instructor with any questions about this content

**By 5/31, 10:00 pm**
Read posted article, “Narrative vs. Evidence-Based Medicine”

**By 5/31, 10:00 pm**
Submit Information Literacy Task #2

**By 5/31, 10:00 pm**
Submit Original Clinical Questions

**By 5/31, 10:00 pm**
Submit group peer evaluations

*Note: This course schedule is subject to change. Students will be notified of any changes.*
### Appendix B: Participation Rubric

<table>
<thead>
<tr>
<th>Points</th>
<th>Criteria</th>
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| 5      | - Fully prepared for every class session (completion of assigned readings and screencasts)  
        | - Actively engaged in class discussions  
        | - Comments in class consistently advanced dialogue  
        | - Comments demonstrated comprehension of previous course material  
        | - Attempted to connect course content with clinical practice  
        | - Actively listened to peers and instructor |
| 4      | - Fully prepared for every class session (completion of assigned readings and screencasts)  
        | - Actively engaged in class discussions  
        | - Comments in class occasionally advanced dialogue or attempted to connect course content with clinical practice  
        | - Comments usually demonstrated comprehension of previous course material  
        | - Actively listened to peers and instructor |
| 3.5    | - Fully prepared for some class sessions (completion of assigned readings and screencasts)  
        | - Actively engaged in some or most class discussions  
        | - Actively listened to peers and instructor |
| 3      | - Fully prepared for some class sessions (completion of assigned readings and screencasts)  
        | - Actively engaged in a few class discussions  
        | - Actively listened to peers and instructor |
| 2      | - Unprepared for most class sessions or rarely actively engaged  
        | - Actively listened to peers and instructor |
| 1      | - Unprepared for most class sessions  
        | - Not engaged in class discussion  
        | - No demonstration of active listening |
| 0      | - Absent |
Appendix C: Instructions and Evaluation for Original Clinical Questions

Instructions:

- Develop 2 original clinical questions based on your shadowing, practicum, or didactic experiences. The questions may be in the domains of therapy, prognosis, etiology, or diagnosis.
- Write a brief clinical scenario explaining what led to the question. (See examples on next page.)
- Identify the question as a therapy (benefit or harm), prognosis, etiology, or diagnosis question.
- Identify the PICO components of the question.
- Submit this electronically in a Word document.

Evaluation:

Total points possible: 10

Total points possible per question: 5

- 1 point if patient scenario/experience that led to question is clearly stated
- 1 point if type of question is correctly identified therapy [treatment benefit or harm], prognosis, etiology, or diagnosis)
- 3 possible points for appropriate wording of PICO question and identification of PICO components

Additionally, one point will be deducted for each grammar/spelling error in the submission.

Note: if question includes a drug, use generic name and spell correctly!
Appendix D: Original Clinical Question Examples

*(good examples from previous year submissions)*

1. **Background:** A middle aged adult male with a diagnosis of hypothyroidism presented to the family practice clinic (where I was shadowing in the fall of 2014) to discuss therapy for this condition. This male explained that his relative with hypothyroidism responded better to desiccated thyroid than levothyroxine. Due to this relative, he requested that his prescription be changed from levothyroxine to desiccated thyroid.

**Question:** “In middle aged adults with hypothyroidism, does desiccated thyroid, compared with levothyroxine, result in increased improvement of hypothyroid symptoms?”

**P:** Middle aged adults with hypothyroidism  
**I:** Desiccated thyroid  
**C:** Levothyroxine  
**O:** Improvement in hypothyroid symptoms

**Question Type:** Therapy benefit.

2. **Background:** One of my residents at the nursing home (where I worked as a nursing assistant prior to PA school), was an 82-year-old male, had Parkinson’s disease. He was taking a drug called Aricept (donepezil) which is currently marketed as a medication for those with Alzheimer’s disease. I wondered whether this drug can also be beneficial in patients with Parkinson’s disease in improving their cognitive ability.

**Question:** “In patients with Parkinson’s disease, does donepezil offer any benefit in improving cognition over time?”

**P:** Patients with Parkinson’s disease  
**I:** Donepezil  
**C:** Placebo  
**O:** Improvement in cognition

**Question Type:** Therapy benefit

3. **Background:** On my practicum last semester, a mother brought her 9-year-old daughter into the clinic for a well-child exam. During the visit, the mother brought up her concern over her daughter’s chronic bed-wetting. She has been wetting the bed almost every night since infancy. She has tried bed alarms, fluid restrictions, and prescription medications (imipramine) to try to cure the problem. Nothing has helped. The child is also severely obese. At 9 years old she weighs 140 lbs and is 4.5 feet tall.

**Question:** Are children who are obese more likely to experience nocturnal enuresis than children who have a healthy body weight?

**P:** children  
**I:** obesity  
**C:** healthy body weight
4. **Background**: This patient was a 17 year-old student athlete who came into the clinic I was shadowing in last year after having unexplained numbness in her right upper extremity. She had gone to the athletic trainer at her school and he thought the clinical exam he performed on her was positive. She had asked the PA if she should get a MRI because that is what the trainer suggested.

**Question**: In high school students with numbness in their upper extremities, is a MRI better than clinical exam at diagnosing thoracic outlet syndrome?

P= high school students with numbness in their upper extremities
I=MRI
C= clinical exam (there is no "gold standard" test)
O= diagnosing thoracic outlet syndrome

**Question Type**: Diagnosis
Appendix E: Evaluation for Group Article Critiques

Total points possible: 35

**Worksheet grading:** will still receive full credit if 2 questions answered incorrectly. After that, 1/2 point deduction for questions that are incorrectly answered or incomplete. (Note: some questions on the worksheet may not apply to a specific article. Use the comments section at the end to make any clarifying comments or give any additional explanations of your answers.)

___ Therapy critique worksheet (group score, 8 points)

___ Prognosis or etiology critique worksheet (group score, 8 points)

___ SR/MA critique worksheet (group score, 8 points)

___ Overall ability of group to work together to discuss and critique articles (group score, 5 points; 5 = excellent; 4 = good; 3 = average; 2 = below average; 1 = poor)

___ Peer evaluation score (individual score, 6 points)

Grade: ___ points
Appendix F: Peer Evaluation Criteria

**Contribution to Group:** Please rate the group member’s active participation in group critique discussions on a scale of 0-5 with a “0” indicating no participation at all and a “5” indicating optimum participation and contribution to the critiques.

**Communication Skills:** check one
- ☐ The group member is an excellent or very good communicator.
- ☐ The group member is an acceptable communicator.
- ☐ The group member is a poor communicator.

**Professionalism:** check one
- ☐ The group member behaves professionally, develops rapport with other group members, resolves conflicts appropriately, respects the opinions of others, and is courteous.
- ☐ The group member behaves professionally but could improve in one of the other areas above (rapport, conflict resolution, respect, or courtesy).
- ☐ The group member is not always professional and needs improvement in more than one area above.
- ☐ The group member is unprofessional.

**Comments (including explanation of any deficiencies noted above):**