CHAPTER 4: DEVELOPING THE QEP

Introduction and Conceptual Model

After selecting the topic and conducting a thorough literature review, a conceptual model for the QEP was developed. Consideration was given to the necessary steps to create an instructional model that would foster higher level learning, specifically in the area of clinical reasoning. It became apparent that to accomplish the desired student learning, a series of steps increasing complexity would be required. These steps would need to build upon each other and progressively develop clinical reasoning skills in order to lead a student from novice to expert.

Clinical reasoning first requires that a learner have a certain knowledge base from which to draw. Step one of the conceptual model is the foundation. This level is designed to develop a base of knowledge for the learner to later use when applying decision-making skills. This step is targeted during the first year of instruction in the curriculum. It focuses primarily on the acquisition of basic science knowledge and its relevance to clinical practice.

Once a sufficient level of knowledge is obtained, the basic concepts of clinical reasoning are then introduced. This process begins with a blending of the acquisition of knowledge and the incorporation of that knowledge into a decision-making process. This transition period, while subtle, is critical to the future development of clinical reasoning skills. This second step in the model is implicitly included in the development of appropriate courses.

The third step of the model is demonstration. Patient cases, requiring the use of both basic science knowledge and fundamental clinical skills, are introduced. These cases allow the expert to “think out loud” and demonstrate the critical reasoning process. A learner then applies these abilities, with guidance, to similar cases. When the skills required for clinical reasoning are modeled by experts, the learner is expected to begin recognizing relevant aspects of the steps necessary in making sound clinical decisions.

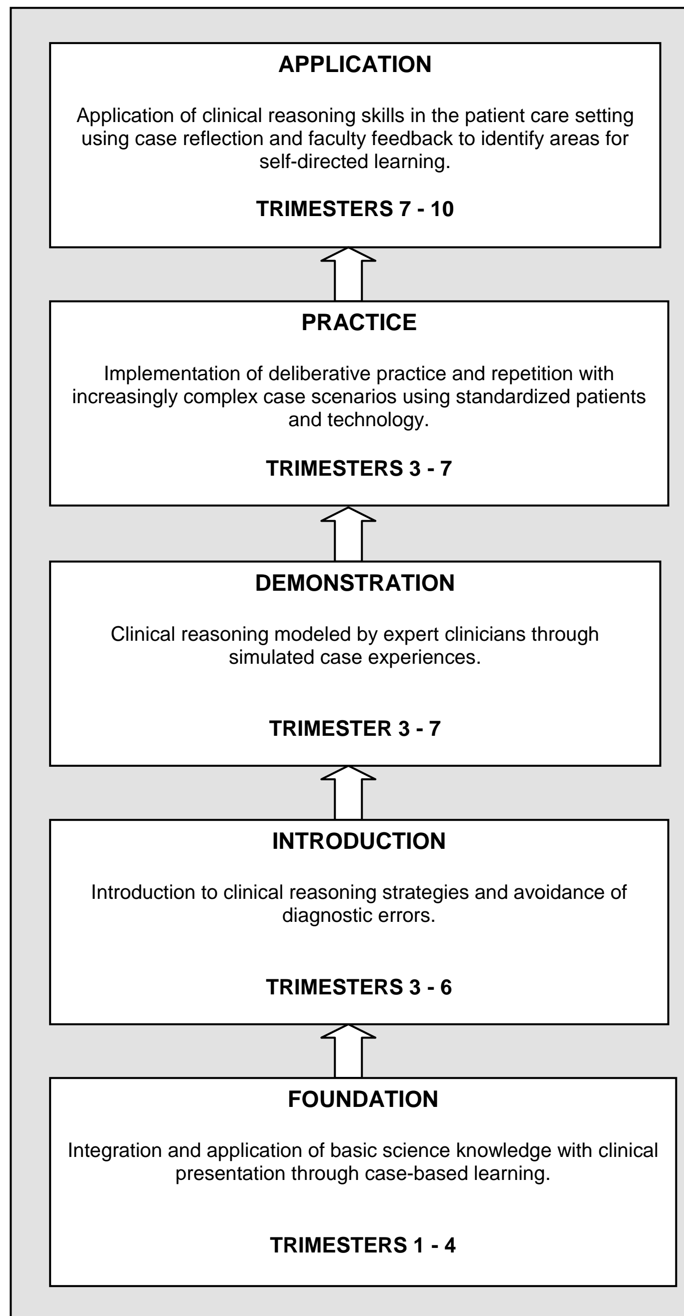
Once basic clinical reasoning skills have been developed, step four of the conceptual model is repetition and practice of the skills. Multiple cases are presented to the learner in various formats that require the use of previously developed clinical reasoning skills. This process provides repetitive practice that leads to the recognition of patterns related to case presentation. Pattern recognition is a critical step in clinical reasoning. It has been demonstrated that physicians rely upon the recognition of elements seen in previous cases, combined with their knowledge base, to ultimately form a diagnostic impression. Steps two, three, and four are targeted in the second year and the beginning of the third year of instruction in the curriculum.

The final step in the model, in the last year of the curriculum, is application of the clinical reasoning process in real world settings. Students engaged in patient management will be expected to integrate clinical reasoning into the decision-making process related to patient care. Direct patient care allows the student to experience increasingly subtle variations in patient presentations, leading to a higher level of reasoning. Additionally, previous knowledge and experiences can be drawn upon to distinguish the key, differentiating elements used to make clinical decisions. This final step is seen as the

capstone experience, utilizing all of the tools acquired during each step of the clinical reasoning development process.

Taking a student from novice to expert in any skill requires a deliberate and sequential approach. This model, as illustrated in the steps below, begins with a solid foundation of appropriate, relevant knowledge and culminates with the direct, practical application of clinical reasoning skills.

STEPS TO CLINIAL REASONING



QEP Design Plan

A subcommittee of the QEP Steering Committee (see Appendix II for subcommittee members) was charged with the responsibility to develop effective methods for integrating clinical reasoning across the curriculum. The first step was to determine programmatic outcomes. The programmatic outcomes were derived from the clinical decision making, clinical reasoning, and judgment domains found in the "The TCC Graduate: An Educational Blueprint for the 21st Century".

The programmatic outcomes are:

1. Integration and application of basic science knowledge with clinical presentations.
2. Introduction and application of clinical reasoning strategies in pre-clinical settings.
3. Application of clinical reasoning skills in patient care settings.

The second step was to develop Student Learning Outcomes (SLOs) that would lead to the fulfillment of each programmatic outcome. For the first programmatic outcome the following SLOs were formulated. The student will:

a. Acquire requisite basic science knowledge as a foundation for clinical reasoning.
b. Demonstrate the relevance of basic science information to clinical application.
c. Understand the basic science mechanisms that relate to clinical presentation and findings.

For the second programmatic outcome, the following SLOs were formulated. The student will:

a. Demonstrate history-taking, examination and diagnostic skills as a foundation for clinical reasoning.
b. Incorporate basic science knowledge to formulate a diagnosis based on acquired patient information.
c. Demonstrate the use of analytic processes (hypothetico-deductive reasoning) and non-analytic resources (pattern recognition) when solving clinical problems;
d. Apply various decision aids and evidence to the clinical decision process.

For the third programmatic outcome, the following SLOs were formulated. The student will:

a. Demonstrate the ability to manage clinical uncertainty in the decision-making process.
b. Identify common errors in clinical reasoning and provide strategies to avoid them.
c. Demonstrate the use of regular self reflection in the clinical learning setting.
d. Effectively utilize clinical reasoning in patient diagnosis and treatment.

These SLOs, or a variation of them, are found in the QEP-focused courses where appropriate. In addition, some of the courses have additional clinical reasoning SLOs that are course-specific.

The third step in the development of the QEP was to identify potential pilot courses. The full curriculum was reviewed and four pilot courses were chosen based upon their sequencing in the curriculum, their clinical application capabilities, and the feasibility of incorporating instructional methods appropriate for fostering clinical reasoning. The four courses are:

- Spinal Anatomy (trimester one)
- Clinical Case Applications (trimester six)
- Clinic I (trimester seven)
- Orthopedics III (trimester eight)

The fourth step in the process was integration of clinical reasoning throughout the curriculum. Course syllabi were extensively reviewed and additional courses were then selected to be part of the plan. These courses were selected because they were either natural building blocks for knowledge or courses where clinical reasoning could be demonstrated and/or applied. The Steering Committee anticipates that the implementation of the selected courses and the demonstrated beneficial effects will motivate other faculty members to incorporate many of the teaching and assessment strategies into their own courses. The existing courses in the curriculum to be included in the overall QEP integration are:

- Gross Human Anatomy I (trimester one)
- Human Biochemistry (trimester one)
- Gross Human Anatomy II (trimester two)
- Spinal Biomechanics (trimester two)
- Cellular and Cardiovascular Physiology (trimester two)
- Clinical Neurology (trimester six)
- Case Management I (trimester seven)
- Clinic II (trimester eight)
- Clinic III (trimester nine)
- Clinic IV (trimester ten)

There was determined to be a need for new courses specifically addressing clinical reasoning early in the educational process. Three new courses were thus placed in trimesters three, four and five and were modeled on the concepts presented in the pilot course, Clinical Case Applications (CCA). These three new courses are: CCA I (trimester three), CCA II (trimester four) and CCA III (trimester five). To maintain a reasonable course load within trimesters 3-5, contact hours for CCA I, II and III were drawn from existing courses. The newly established CCA courses will incorporate material from the affected courses within a clinical context.

Effective communication and history-taking skills are intrinsically linked to clinical reasoning skills. Therefore, two new courses in communications and history-taking have been added to the curriculum. They are: Basic Communication and History-Taking Skills (trimester three) and Advanced Communication and History-Taking Skills (trimester four).

Table 4.1 reflects the entire QEP curriculum.

Table 4.1: Courses in the QEP Curriculum

Courses	Trimester
Gross Anatomy I Spinal Anatomy Human Biochemistry	1
Gross Anatomy II Spinal Biomechanics Cellular & Cardiovascular Physiology	2
Clinical Case Applications I Basic Communication and History Taking Skills	3
Clinical Case Applications II Advanced Communication and History Taking Skills	4
Clinical Case Applications III	5
Clinical Case Applications IV Clinical Neurology	6
Clinic I Case Management I	7
Orthopedics III Clinic II	8
Clinic III	9
Clinic IV	10

The fifth step in the process was identification of teaching strategies to promote clinical reasoning. After an exhaustive review of the literature, a variety of instructional and curricular models were selected. Examples of strategies that may be utilized are outlined in Table 4.2.

Table 4.2: Teaching Strategies

Standardized patients (SP) (Ainsworth et al., 1991; Brownell Anderson, Stillman, & Wang, 1994) Definition: A method that uses individuals who have been trained to portray various clinical conditions and scenarios or actual patients who have been trained to standardize their responses about their respective conditions. Description: SP are used in both teaching and assessment. The encounter closely mirrors an actual patient interaction and, therefore, offers a more authentic presentation of clinical reality.
Case-based learning (Mandin, Harasym, Eagle, & Watanabe, 1995; Mandin et al., 1997; Papa & Harasym, 1999; Patel, Groen, & Norman, 1991; Schmidt, Dauphinee, & Patel, 1987; Schmidt, Vermeulen, & Van Der Molen, 2006; Srinivasan et al., 2007) Definition: A learner-centered approach to building knowledge that requires students to solve clinical problems using real world examples. Description: Varied case formats are utilized, including written, standardized patients and computer-based. Written cases range from brief scenarios used to illustrate a point to elaborate unfolding cases with integrated questions to help students develop clinical reasoning patterns and apply knowledge. Standardized patient cases are designed to fit specific objectives, where emphasis and complexity can be controlled. Computer-generated cases increase the variability in presentation of case details and allow the incorporation of visual and auditory media.
Team-based learning (Meeuwsen, 2002; Michaelsen et al., 2004; Sweet & K., 2007) Definition: A faculty-directed active learning instructional strategy where students apply and integrate knowledge in interactive groups to master concepts and develop problem-solving abilities. Description: Students are assigned to learning teams. All students have specific learning objectives regarding a topic. Prior to the team learning activity, all students are assessed on the assigned learning objectives. Student teams engage in the learning activity. All teams then share the results of their learning activity in the ensuing discussion.
Faculty modeling Definition: An instructional approach in which faculty think out loud to justify or explain case-related clinical decisions. Description: A clinician models a history and physical examination on an SP based on the clinical presentation. There are scripted "time outs" for the clinician to provide his/her rationale for asking specific history questions, performing specific diagnostic procedures, and/or developing a diagnosis and patient care decisions.
SNAPPS (Wolpaw et al., 2003) Definition: A learner-centered approach to clinical teaching that promotes higher-level clinical reasoning skills by having learners reflect on the clinical problem and possible solutions, justify their clinical decisions, and explore unanswered questions. • S – Summarize the history and physical findings. • N – Narrow the differential to two or three relevant possibilities. • A – Analyze the differential by justifying, comparing and contrasting the possibilities. • P – Probe the student/intern by asking questions about uncertainties, difficulties or alternative approaches. • P – Plan the management for the patient's health issues. • S – Select a case-related issue for self-directed learning. Description: Students present multiple cases in the SNAPPS format to understand the

logic and rationale of the clinical thought process in formulating the diagnosis and plan of care. Students are exposed to increasingly complex cases as their clinical reasoning skills develop.
Application Oriented Teaching (Coderre, Mandin, Harasym, & Fick, 2003; Ericsson, 2004; Oglesby et al., 2008; Papa, 2008; Papa & Harasym, 1999; Papa et al., 2007) Definition: A teaching method emphasizing comprehension and application of knowledge and skills over information acquisition. Description: This method can be accomplished by task-focused, deliberate practice. By utilizing multiple cases, the students demonstrate the use of prior knowledge in solving new problems similar to previously solved problems.
Reflective practice (Moulton et al., 2007; Schön, 1983, 1987) Definition: Critical self-assessment of past actions and their consequences to gain understanding and to generate new knowledge and insights that enhance clinical reasoning in practice. Description: Reflection enhances learning through experience. Students are stimulated by faculty to systematically assess and critically analyze their clinical reasoning and formulate alternative approaches. Reflection best occurs in a challenging, but safe, learning environment through open-ended questioning and by appropriate feedback.
Electronic real-time student feedback (I-Clicker) Definition: An instructional approach utilizing electronic devices that provide instantaneous feedback to both student and instructor regarding student understanding of the concepts, questions, and cases presented in the classroom. Description: Students will use a clicker to answer questions electronically while in the classroom. An advantage of this approach is immediate feedback to student responses. The feedback can be used in reciprocal teaching whereby the students learn from each other through discussion of their answers in a collaborative group. This interactive system informs the faculty, in real time, of student understanding. This enables the faculty to focus on concepts that are unclear.

The final step of the process was to identify effective methods for course assessment and programmatic evaluation. Based upon the literature review, a variety of assessment/evaluation strategies were selected at both the course and programmatic levels. Detailed explanations of the selected assessment/evaluation strategies are found in Chapter Five.

Clinical Reasoning Design Plan for Pilot Courses

Four pilot courses for clinical reasoning will be implemented in the Summer 2009 trimester. The four courses are described below with the following information:

- Course description.
- Programmatic outcomes relating to the course.
- Course learning outcomes that reflect clinical reasoning.
- Teaching methods related to clinical reasoning.
- Assessment strategies.
- Course schedule.

Spinal Anatomy (Trimester 1)
Course Description:
This course is a study of the gross anatomy of the human spine focusing on the osseous, ligamentous and muscular structures of the cervical, thoracic, lumbar, sacral and coccygeal regions. It also introduces the student to the neuroanatomy of the spinal cord, spinal nerves, and the autonomic nervous system. Emphasis is placed on the important anatomical relations in the practice of chiropractic. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to spinal anatomy with contributions from other courses in trimester one when appropriate.

Programmatic Outcomes Related to Clinical Reasoning in the Course:
- Integration and application of basic science knowledge with clinical presentations.

Student Learning Outcomes Related to Clinical Reasoning:
The student will:
- Acquire requisite knowledge of spinal anatomy as a foundation for clinical reasoning.
- Correlate clinical presentation to the anatomical structures of the spine and surrounding tissues.
- Integrate knowledge of spinal anatomy with different clinical presentations.
- Demonstrate the relevance of basic science information to clinical application.

Teaching Methods Related to Clinical Reasoning:
- Design-A-Case: The primary intervention will be instructor-designed, computer-based case presentations related to spinal anatomy. The cases will follow a simple on-line format (Design-A-Case). The students will be given specific learning objectives for each case. The case starts with an initial presentation. Questions are asked relevant to the case presentation relating to epidemiology, etiology, and basic science knowledge. Once the students' responses are submitted, faculty feedback will be presented.
- Case-Based Learning: The instructor will include case presentations and clinical correlations during lecture to demonstrate the relevance between basic and clinical sciences.
- Electronic Real-Time Student Feedback (I Clicker): Students will use an electronic interactive learning system by which they answer questions electronically while in the classroom. An advantage of this approach is immediate feedback to student answers. The feedback can be used in reciprocal teaching whereby the students learn from each other by discussing their correct/incorrect answers in a collaborative group. This interactive system also informs the instructors, in real time, of students' understanding, enabling the instructor to focus on misconceptions and concept areas that are unclear.

Assessment Tools:
Student achievement in this course is assessed through three written examinations, ten quizzes and a final comprehensive examination. The four written examinations include:
- Extended matching questions (EMQ)
- Multiple choice questions (MCQ)
- Matching questions

- Clinical cases
- Diagrams

Quizzes may include MCQ, true/false and matching questions. In-class electronic real-time student feedback may also be used as an assessment tool.

Pilot Course Schedule

Summer 2009

Week	Topics
1	Introduction and overview of the vertebral column Curves, curvatures and pyramids, clinical cases Typical and atypical vertebrae
2	Quiz #1 Cervical vertebrae, occiput Overview of joints and classification Joints and ligaments of the cervical region Clinical cases
3	Quiz #2 Vertebrobasilar system and Circle of Willis, Clinical cases Thoracic vertebrae, typical and atypical
4	Quiz #3 Joints and ligaments of thoracic vertebrae. First written examination
5	Lumbar vertebrae, typical and atypical IVDs and facet joints, clinical cases Sacrum, coccyx and hip bone
6	Quiz #4 Sacroiliac joints and ligaments, clinical cases Muscles of the back
7	Quiz #5 Muscles of the back
8	Second written examination Prevertebral muscles Spinal cord, clinical cases
9	Quiz #6 Spinal cord, meninges and blood supply
10	Quiz #7 Peripheral nervous system, Cervical and brachial plexuses Lumbar and sacral plexuses, clinical cases
11	Quiz #8 Autonomic nervous system (ANS) Third written examination
12	Quiz #9 Autonomic nervous system, clinical cases
13	Quiz #10 Development of the vertebral column Clinical cases
14	Review for the final exam
15	Comprehensive final examination

Clinical Case Applications* (Trimester 6)
Course Description:
Building upon the students' clinical reasoning skills, this course will teach strategies for identification and avoidance of common errors in clinical reasoning, management of clinical uncertainty in the decision-making process and application of pattern recognition in the clinical solving process. While drawing primarily on material from Orthopedics I, Adjusting Procedures IV and Clinical Neurology, complex clinical cases will require assimilation of all accumulated knowledge for appropriate diagnoses and treatment plans. The use of standardized patients in both teaching and assessment enhances the learning process.
*This course will be renamed Clinical Case Applications IV upon full implementation of the plan.

Programmatic Outcomes Related to Clinical Reasoning in this Course:
- Integration and application of basic science knowledge with clinical presentations.
- Introduction and application of clinical reasoning strategies in pre-clinical settings.

Student Learning Outcomes Related to Clinical Reasoning:
The student will:
- Incorporate basic science knowledge to form a diagnosis based on patient information.
- Recognize the relevant aspects of a patient's clinical presentation that influence the differential diagnosis list.
- Perform a patient interview and physical examination that elicits the necessary information to develop a probable list of differential diagnoses.
- Incorporate concepts of clinical reasoning to determine appropriate diagnostic investigations and to formulate a therapeutic management plan.
- Incorporate analytic processes and non-analytic resources when solving clinical problems.
- Apply epidemiologic knowledge, clinical experience, knowledge of test capabilities, and decision aids within the patient's clinical context to select the most appropriate diagnostic investigations.
- Identify common errors in clinical reasoning and provide strategies to avoid them.
- Demonstrate the ability to manage uncertainty in the clinical decision-making process.

Teaching Methods Related to Clinical Reasoning:
- <u>Case-Based Learning:</u> This course will utilize case-based learning with standardized patients (SPs). Three cases will be developed based on clinical presentations related primarily to conditions most likely to present in a chiropractor's office. A clinician will model a history and physical examination on an SP based on the clinical presentation. There will be scripted "time outs" for the clinician to provide his/her rationale for asking specific history questions and/or performing specific diagnostic procedures on the SP. In subsequent weeks the students will have three opportunities to do their own SP encounters. Prior to the encounter, the students will be provided with a list of specific learning objectives. These encounters will have both a formative and a summative assessment. The

cases will require students to incorporate their acquired knowledge of both basic and clinical sciences.

- Electronic Real-Time Student Feedback (I-Clicker)

Assessment Tools:
Examples that may be utilized in the pilot course for evaluation of clinical reasoning:
- SP encounters.
- Extended matching questions.
- Key features questions.
- Electronic real-time student feedback (I-Clicker).

Pilot Course Schedule

Summer 2009

Week	
1	Introduction and Syllabus
2	Clinical Reasoning Concepts
3	Differential Diagnosis
4	Differential Diagnosis
5	Differential Diagnosis
6	Differential Diagnosis
7	Case #1 (Expert model with SP) - Classroom
8	Case #2 (SP Experience) - Assessment Center
9	Case #3 (Expert model with SP) - Classroom
10	Case #4 (SP Experience) - Assessment Center
11	Case #5 (Expert model with SP) – Classroom
12	Case #6 (SP Experience) - Assessment Center
13	Differential Diagnosis Review / Case Wrap-up
14	Lab Final
15	Final Exam

Clinic I (Trimester 7)
Course Description:
The Campus Health Center (CHC) is designed to give students initial experience in the clinical setting. The CHC operates as a fully functional campus clinic providing chiropractic care to students, faculty and staff as well as their families. The CHC provides the students with a forum for practical application of clinical knowledge and reasoning, skills, and attitudes obtained through the first six trimesters.

Programmatic Outcomes Related to Clinical Reasoning in this Course:
- Integration and application of basic science knowledge with clinical presentations.
- Introduction and application of clinical reasoning strategies in pre-clinical settings.
- Application of clinical reasoning skills in patient care settings.

Student Learning Outcomes Related to Clinical Reasoning:
The student will:

- Formulate a diagnosis and management plan appropriate to the history, examination findings and any co-morbidity that the patient may exhibit. .
- Determine the necessity for laboratory studies (urinalysis, complete blood count, and blood chemistry), x-rays and special studies in the clinical decision process.
- Develop a rationale for appropriate referrals and/or collaborative care.
- Construct a systematic approach and delivery of patient care.
- Utilize outcome measures to substantiate care.
- Perform regular self reflection regarding their clinical decision-making skills.
- Demonstrate the ability to manage clinical uncertainty in the decision-making process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.

Teaching Methods Related to Clinical Reasoning:
SNAPPS model of clinical teaching: A learner-centered technique for case presentations.

- S – Summarize the history and physical findings.
- N – Narrow the differential to two or three relevant possibilities.
- A – Analyze the differential by justifying, comparing and contrasting the possibilities.
- P – Probe the student/intern by asking questions about uncertainties, difficulties or alternative approaches.
- P – Plan the management for the patient's health issues.
- S – Select a case-related issue for self-directed learning.

The SNAPPS model will be the primary intervention for this pilot. The interns will be introduced to the SNAPPS model during the first week of the trimester and will be provided with guidelines and expectations for the use of SNAPPS. The instructors will encourage the critical thinking process of the interns. The instructors will assist the intern in the clinical reasoning process by identifying deficiencies, providing constructive, corrective measures and assigning self-learning tasks. Students should correlate past classroom tasks into clinical skills related to patient care. At this entry level to clinical experiences, the student will be accountable to their patients to perform appropriate quality care under the direct guidance of the course instructors. Assessment tools will be utilized to monitor the clinical reasoning process, knowledge and skill.

Assessment Tools:
Examples that may be utilized in the pilot course for evaluation of clinical reasoning:

- Direct observation of SNAPPS model by checklist on personal digital assistant (PDA).
- OSCE format (CSCE I).
- SP encounters.
- Extended matching questions (EMQ).
- Script concordance questions.
- Global rating assessment.
- Case-based discussion (chart stimulated recall).
- Knowledge-based inference tool (KBIT).

Student Responsibilities:
The student will:

- Utilize the SNAPPS model to promote, integrate and enhance the clinical thought process.
- Present cases to clinician in "SNAPPS" format.
- Be observed over a minimum of three cases that will vary in complexity between straightforward, moderate and complex.
- Understand that clinical reasoning is a process and relaying uncertainties to the clinician is an integral part of the process.
- Ask history questions related to differential diagnosis (ddx).
- Perform appropriate exam procedures related to ddx.
- Formulate a problem list.
- Identify co-morbidities.
- Correlate the importance of active learning of cases with clinical reasoning.
- Understand that feedback appropriate for a Doctor of Chiropractic will be given by instructors on a daily basis.

Pilot Course Schedule:

Summer 2009

Week	
1	SNAPPS Model Introduction
2	Direct Observation Case 1,
3	Direct Observation Case 1
4	Direct Observation Case 1, KBIT
5	Direct Observation Case 2
6	Direct Observation Case 2
7	Direct Observation Case 2, KBIT
8	Global Rating Assessment
9	Direct Observation Case 3
10	Direct Observation Case 3
11	Direct Observation Case 3
12	Direct Observation Case 3, KBIT
13	OSCE 1 with Extended Matching questions
14	Faculty Interview
15	OSCE 1 (if necessary)

Orthopedics III (Trimester 8)
Course Description:
The lecture portion of this course strives to enhance the student's ability to differentially diagnose neuromusculoskeletal conditions. Students are required to assess the literature regarding sensitivity, specificity and reliability of the various orthopedics procedures and/or management of clinical conditions. The lab portion is designed to enhance record keeping, diagnostic and differential diagnosis skills through practice and clinical cases. The course will follow the principles of application-oriented curriculum. In addition, it will utilize standardized patient encounters to assess history, diagnostic, and clinical reasoning skills.

Programmatic Outcomes Related to Clinical Reasoning in this Course:

- Integration and application of basic science knowledge with clinical presentations.
- Introduction and application of clinical reasoning strategies in pre-clinical settings.
- Application of clinical reasoning skills in patient care settings.

Student Learning Outcomes Specific to Clinical Reasoning:

The student will:

- Perform, analyze and use the results of the musculoskeletal assessment to accurately diagnose and differentially diagnose the patient's clinical presentation.
- Demonstrate clinical reasoning in his/her assessment, differential diagnosis and management of the patient's presentation.
- Accurately utilize outcome measures when managing a patient.
- Apply self-reflection in the clinical decision-making process.
- Demonstrate the ability to manage clinical uncertainty in the decision-making process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.

Teaching Methods Related to Clinical Reasoning:

- Application-Oriented Teaching: The principles of application-oriented teaching will be utilized in this course. Prior to each lecture session, the students will be provided with objectives to fulfill as they are reviewing pertinent information from the Orthopedics I and II courses regarding a topic. The students will be presented with multiple cases in lecture, and they will be asked to make a diagnosis based on the information presented. Electronic real-time student feedback (I-Clicker) will be used as a means of performing both formative and summative assessment of their ability to diagnose their patients. After the responses are received, the students will be asked to identify what changes in the historical picture or examination findings would make the other differentials for that diagnosis plausible.
- Lab Instruction: In the lab, the students will review and improve on their neuromusculoskeletal diagnostic skills and record keeping skills. They will have case presentations that they will have to work up on a peer or on standardized patients.
- KBIT: the students will be provided with release time to go to the computer lab and work through computer-generated cases in KBIT.

Assessment Tools:

- Lecture Exams: The course contains a midterm exam and a final. These examinations may contain multiple choice, true/false, extended matching, key features and/or script concordance questions so that both their knowledge and clinical reasoning skills can be assessed.
- Cases: Two clinical cases will occur over the course of the trimester, each student will perform as the doctor twice and the patient twice. The doctor will be assessed on his/her performance of a history and examination, charting, clinical decision making and diagnostic skills as well as professionalism. The doctor will have approximately 25 minutes to perform a history of the chief complaint and all pertinent examinations in an order that makes sense. Both the doctor and the patient will receive a zero on the case if it is determined that procedures are not

being performed to the doctor's best capability, or are omitted, and if the patient is providing unsolicited information.

- Standardized patient encounters: These evaluations may have both a formative and summative component. Possible evaluation points in the SP encounters may include:
    - History-taking skills as evaluated by the SP and post-encounter questions
    - Professionalism as evaluated by the SP
    - Selection of appropriate examinations
    - Accurate performance of examination procedures
    - Interpretation of the examination procedures and formulating a diagnosis

  SP Encounter #1 – will focus on history-taking skills and the ability to determine what exams to perform and possible differential diagnoses from the history.

  SP Encounter #2 – will focus on appropriate exam selection from the provided history; performance of examination procedures in a logical sequence, accurate performance of the examinations, and the ability to interpret findings and render a diagnosis.

  SP Encounter #3 – will be a combination of performing a history and examination on the patient to formulate a diagnosis.
- Participation and Self Reflection Survey: The course will be interactive and case based, each student is required to participate in the discussions of the cases in lecture as well as performance of lab regional exams and charting. The instructor will be assessing the students on their participation, and at the end of the trimester all students will turn in a self-assessment of how well they participated in the both the lecture and lab portion of the course as well as their perception of their diagnostic skills.

Pilot Course Schedule:

Summer 2009

Week	
1	Outcome measures Lab: Review lab procedures
2	Differential Diagnosis (DDx). Headaches and dizziness Lab: Review lab procedures
3	DDx. Neck and upper extremity disorders Lab: Regional examinations
4	DDx. Neck and upper extremity disorders Lab: Case #1
5	Standardized patient encounter #1
6	DDx. Thorax and chest wall disorders Lab: Regional examinations
7	DDx. Low back disorders Lab: Regional examinations
8	Midterm written examination Lab: Regional examinations
9	Standardized patient encounter #2

10	DDx. Low back disorders Lab: Regional examinations
11	DDx. Lower extremity disorders Lab: Case #2
12	DDx. Lower extremity disorders Lab: Lab review
13	DDx. Arthritides
14	Final Standardized patient practical examination
15	Final written examination

Implementation of QEP Across the Curriculum

The pilot courses will initially be offered during the Summer 2009 trimester. Thorough evaluation of the four pilot courses will be conducted through the use of faculty interviews, student course evaluation, course-based examinations, case-based discussions, CSCE I, DAC, and KBIT. Alterations or improvements to the instructional and assessment strategies will be made as required based on the evaluations. The four pilot courses will be conducted again in the Fall 2009 trimester with the incorporation of any necessary changes. With the four pilot courses now fully implemented and ongoing, the remainder of the QEP courses will be implemented across the curriculum starting in Spring 2010. Full QEP implementation will be completed by Spring 2012. See Chart 4.1 at the end of the chapter for a visual overview of the implementation timeline.

Trimester 1

Gross Anatomy I

Course Description:

Gross anatomy of the human body emphasizing the back, walls of the thorax and abdomen and the upper and lower extremities. The laboratory portion of the course covers cadaver dissection. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to Gross Anatomy I with contributions from other courses in trimester one when appropriate.

Intervention/Teaching Strategies:

- Case presentations during lecture to show the relevance between the basic and clinical sciences.
- Electronic real-time student feedback (I-Clickers).
- Computer-based case presentations (DAC).

Examples of Assessment Tools for Clinical Reasoning:

- Extended matching questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:

- Integrate knowledge of gross anatomy with different clinical presentations.
- Demonstrate the relevance of anatomy to clinical application.
- Acquire requisite anatomy knowledge as a foundation for clinical reasoning.

Expected Implementation: Spring 2010

Human Biochemistry
Course Description:
This course provides an overview of human biochemistry, including the general fundamentals of metabolism, the role of enzymes and enzyme kinetics and energy use and production. Carbohydrate, lipid, protein, nucleic acid, vitamin and mineral metabolism are examined in detail. An overview of genetic coding is introduced. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to Human Biochemistry with contributions from other courses in trimester one when appropriate.

Intervention/Teaching Strategies:
- Case presentations during lecture to show the relevance between the basic and clinical sciences.
- Electronic real-time student feedback (I-Clickers).
- Computer-based case presentations (DAC).

Examples of Assessment Tools for Clinical Reasoning:
- Extended matching questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:
- Integrate knowledge of human biochemistry with different clinical presentations.
- Demonstrate the relevance of biochemistry to clinical application.
- Acquire requisite biochemistry knowledge as a foundation for clinical reasoning.

Expected Implementation: Spring 2010

Trimester 2

Gross Anatomy II
Course Description:
This course details the gross anatomy of the human neck and head, thoracic and abdominal viscera, pelvis and external genitalia. The laboratory portion of the course covers cadaver dissection. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to Gross Anatomy II with contributions from other courses in the curriculum when appropriate.

Intervention/Teaching Strategies:
- Case presentations during lecture to show the relevance between the basic and clinical sciences.
- Electronic real-time student feedback (I-Clickers).
- Computer-based case presentations (DAC).

Examples of Assessment Tools for Clinical Reasoning:
- Extended matching questions.

- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:
- Integrate knowledge of gross anatomy with different clinical presentations.
- Demonstrate the relevance of anatomy to clinical application.
- Acquire requisite anatomy knowledge as a foundation for clinical reasoning.

Expected Implementation: Summer 2010

Spinal Biomechanics

Course Description:
This course presents a detailed analysis of the anatomy, normal biomechanics and pathobiomechanics of the spine and pelvis and how they relate to common clinical problems. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to Spinal Biomechanics with contributions from other courses in the curriculum when appropriate.

Intervention/Teaching Strategies:
- Case presentations during lecture to show the relevance between the basic and clinical sciences.
- Electronic real-time student feedback (I-Clickers).
- Computer-based case presentations (DAC)

Examples of Assessment Tools for Clinical Reasoning:
- Extended matching questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:
- Integrate knowledge of spinal biomechanics with different clinical presentations.
- Demonstrate the relevance of spinal biomechanics to clinical application.
- Acquire requisite spinal biomechanics knowledge as a foundation for clinical reasoning.

Expected Implementation: Summer 2010

Cellular and Cardiovascular Physiology

Course Description:
This course discusses the principles of cellular and cardiovascular physiology. An overview of the structural and functional aspects of membrane transport and muscle physiology is covered. The structure, function and regulation of the heart and circulatory system are described. Correlations will be made to various clinical presentations using a computer case-based program and instructor presentation of cases. The cases will emphasize clinical presentations related to Cellular and Cardiovascular Physiology with contributions from other courses in the curriculum when appropriate.

Intervention/Teaching Strategies:

- Case presentations during lecture to show the relevance between the basic and clinical sciences.
- Electronic real-time student feedback (I-Clickers).
- Computer-based case presentations (DAC).

Examples of Assessment Tools for Clinical Reasoning:

- Extended matching questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:

- Integrate knowledge of cellular and cardiovascular physiology with different clinical presentations.
- Demonstrate the relevance of physiology to clinical application.
- Acquire requisite physiology knowledge as a foundation for clinical reasoning.

Expected Implementation: Summer 2010

Trimester 3

Clinical Case Applications I (New Course)
Course Description:
This course serves as an introduction to the clinical reasoning process through the utilization of a case-based learning format. The students will apply their accumulated basic science knowledge to clinical cases, with particular emphasis on neuroanatomy and general pathology. They will learn to formulate differential diagnoses. The use of standardized patients in both teaching and assessment enhances the learning process.

Intervention/Teaching Strategies:

- This course will utilize standardized patients (SPs). Six cases will be developed based on clinical presentations generated from either the Neuroanatomy or General Pathology course. A clinician will model a history and physical examination on an SP based on the clinical presentation. There will be scripted “time outs” for the clinician to provide his/her rationale for asking specific history questions and/or performing specific diagnostic procedures on the SP. In subsequent weeks the students will have three opportunities to do their own SP encounters. These encounters will have both a formative and a summative assessment. Prior to the encounter, the students will be provided with a list of specific learning objectives.
- Electronic real-time student feedback (I-Clickers).

Examples of Assessment Tools for Clinical Reasoning:

- SP encounters.
- Extended matching questions.
- Key features questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:

- Incorporate basic science knowledge to formulate a diagnosis based on acquired patient information.
- Recognize the relevant aspects of a patient's clinical presentation that influence the differential diagnosis list.
- Perform a patient interview that elicits the necessary information to develop a possible list of differential diagnoses.
- Introduce the basic concepts of clinical reasoning to determine appropriate diagnostic investigations.

Expected Implementation: Fall 2010

Basic Communication and History-Taking Skills (New Course)

Course Description:

This course serves as an introduction to the verbal and non-verbal communication skills necessary for effective patient interaction. The students practice the skills needed to obtain a basic history based on the patient's chief complaint. They will also elicit basic information on past medical history, family history, review of systems, and current health status and effectively organize the gathered information to develop an initial problem list. Standardized patients will be used in both teaching and assessment to enhance the learning process.

Intervention/Teaching Strategies:

- Modeling of communication and history-taking skills by course instructor and/or video presentations.
- Practicing communication and history-taking skills.
- SP encounters.
- Electronic real-time student feedback (I-Clickers).

Examples of Assessment Tools for Clinical Reasoning:

- Evaluate videos of communication and history-taking skills.
- SP encounters.
- Self-evaluation of video encounter.

Student Learning Outcomes Specific to Clinical Reasoning:

- Formulate and employ an organized and logical method of inquiry when taking the history.
- Identify and revise the course of the patient interview in response to patient verbal and non-verbal cues.
- Prioritize the information obtained from the patient history based on clinical importance and relevance.

Expected Implementation: Fall 2010

Trimester 4

Clinical Case Applications II (New Course)
Course Description:
This course will build upon the clinical reasoning skills introduced in Clinical Case Applications I. With emphasis on material from Systems Pathology I and Renal, Respiratory and Gastroenteric Physiology, students will assimilate acquired basic and clinical science knowledge in developing differential diagnoses in a case-based learning format. Students will begin to recognize common clinical presentations. The use of standardized patients in both teaching and assessment enhances the learning process.

Intervention/Teaching Strategies:

- Same teaching strategy as described in CCA I; however, the topic of the cases will be derived primarily from the courses Systems Pathology I and Renal/Respiratory/Gastroenteric Physiology.
- Electronic real-time student feedback (I-Clickers).

Examples of Assessment Tools for Clinical Reasoning

- SP encounters.
- Extended matching questions.
- Key features questions.
- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:

- Incorporate basic science knowledge to formulate a diagnosis based on acquired patient information.
- Recognize the relevant aspects of a patient's clinical presentation that influence the differential diagnosis list.
- Perform a patient interview that elicits the necessary information to develop a possible list of differential diagnoses.
- Apply basic concepts of clinical reasoning to determine appropriate diagnostic investigations.
- Demonstrate ability to use clinical reasoning when formulating a diagnosis.

Expected Implementation: Spring 2011

Advanced Communication and History-Taking Skills (New Course)
Course Description:
This course will build upon the skills learned in the Basic Communication & History-Taking Skills course. The students will practice the skills needed to address challenging patient communication issues such as delivering bad news, interacting with diverse patient populations, and handling the agitated patient. History-taking skills will be honed to elicit sufficient secondary and tertiary information to obtain a more detailed history. The students will learn how to modify their patient history based upon the patient's age, gender or cultural differences. Standardized patients will be used in both teaching and assessment to enhance the learning process.

Intervention/Teaching Strategies:

- Modeling of communication and history-taking skills by course instructor and/or video presentation.
- Practicing communication and history-taking skills.
- SP encounters.
- Electronic real-time student feedback (I-Clickers).

Examples of Assessment Tools for Clinical Reasoning:

- Evaluate videos of communication and history-taking skills.
- SP encounters.
- Self-evaluation of video encounter.

Student Learning Outcomes Specific to Clinical Reasoning:

- Identify the logical secondary and tertiary questions that are needed to obtain a detailed history based on the patient's responses.
- Determine the basic diagnostic procedures that should be performed based on the patient's history.
- Identify pathological, behavioral and other indicators from the history that may lead to uncertainty or errors in the decision-making process.
- Understand how the form of the history or line of inquiry may change based upon the patient's unique characteristics or clinical presentation.

Expected Implementation: Spring 2011

Trimester 5

<u>Clinical Case Applications III (New Course)</u>
Course Description:
This course will build upon the skills learned in Clinical Case Applications II. There will be greater complexity in case presentations, utilizing accumulated basic and clinical science knowledge with particular emphasis on material from Physical Examination & Diagnosis, Diagnostic Imaging II and Adjusting Procedures III. In addition to recognizing common presentations, formulating differential diagnoses and a final diagnosis, the students will begin to develop appropriate adjustive and/or other therapeutic intervention strategies. The use of standardized patients in both teaching and assessment enhances the learning process.

Intervention/Teaching Strategies:

- Electronic real-time student feedback (I-Clickers).
- With a similar instructional strategy to CCA I and CCA II, this course will require higher level reasoning skills on the part of the student with integration from additional clinical courses. The content of the cases will be related primarily to conditions taught in Adjusting Procedures III, Physical Examination & Diagnosis and Diagnostic Imaging II.

Examples of Assessment Tools for Clinical Reasoning

- SP encounters.
- Extended matching questions.
- Key features questions.

- Electronic real-time student feedback (I-Clickers).

Student Learning Outcomes Specific to Clinical Reasoning:

- Incorporate basic science knowledge to formulate a diagnosis based on acquired patient information.
- Recognize the relevant aspects of a patient's clinical presentation that influence the differential diagnosis list.
- Perform a patient interview and physical examination that elicits the necessary information to develop a probable list of differential diagnoses.
- Apply basic concepts of clinical reasoning to determine appropriate diagnostic investigations.
- Demonstrate ability to use clinical reasoning when formulating a diagnosis.
- Apply various decision aids and evidence to the clinical process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.

Expected Implementation: Summer 2011

Trimester 6

Clinical Neurology

Course Description:

This course offers a didactic and practical approach to the study of the central and peripheral nervous systems with emphasis on the applied anatomy, physiology and symptomology of the various pathologic states. The students will need to recognize common neurological presentations, formulate differential diagnoses, a final diagnosis, and determine viable methods for management. Cases will be presented in the course as a way to make these correlations. Standardized patients will be used to assess the students' progress.

Intervention/Teaching Strategies:

- A lab component will be added to the Clinical Neurology course. The lab hours will provide practical application of neurological assessment and enhance the concepts presented in the lecture portion of the course.

Examples of Assessment Tools for Clinical Reasoning:

- Extended matching questions.
- Key features questions.
- Electronic real-time student feedback (I-Clickers).
- Script concordance questions.

Student Learning Outcomes Specific to Clinical Reasoning:

- Incorporate relevant basic science knowledge to formulate a diagnosis based on patient information.
- Select and demonstrate appropriate neurological examination procedures based upon the patient's history and presentation.
- Correlate findings from the neurological examination with the patient's history, physical exam, orthopedic exam and diagnostic studies to formulate a diagnosis.
- Integrate information from the patient's history, physical exam, orthopedic exam, neurological exam and diagnostic studies to determine an appropriate treatment plan.

- Demonstrate ability to use clinical reasoning when formulating a diagnosis.

Expected Implementation: Fall 2011

Trimester 7

<u>Case Management I</u>
Course Description:
This course includes the development and the recording of management plans based upon the patient's clinical presentation of common neuromusculoskeletal disorders. The course will also address when referral and/or collaborative care may be warranted and how the management plan may be altered based upon outcome measures.

Intervention/Teaching Strategies:
- Case-based learning approach combined with team-based learning.

Examples of Assessment Tools for Clinical Reasoning:
- Extended matching questions.
- Key features questions.
- Script concordance questions.
- Self-reflection survey.
- Assessment of management plans with scoring rubric.

Student Learning Outcomes Specific to Clinical Reasoning:
- Describe a variety of treatment options used in common musculoskeletal injuries.
- Select the appropriate treatment protocol based on a patient's phase of injury, age and health status.
- Apply self-reflection in the clinical decision-making process.
- Determine when referral or co-management is warranted based on the patient's presentation.
- Identify common errors in clinical reasoning and provide strategies to avoid them.
- Demonstrate the ability to manage uncertainty in the clinical decision-making process.

Expected Implementation: Spring 2012

Trimester 8

<u>Clinic II</u>
Course Description:
Building upon pre-clinical coursework and clinical skills learned in Clinic I (Campus Health Center), interns provide chiropractic care to the public in the Moody Health Center under the mentoring and supervision of faculty attending clinicians. All elements of doctor-patient interaction are reviewed and discussed, including history taking, physical examination, diagnostic studies, development of a diagnosis, and implementation of a therapeutic management plan. Total patient care encompasses patient re-evaluation, outcome assessment, and documentation.

Intervention/Teaching Strategies:
- Self-directed, computer-based case simulations.
- SNAPPS model of clinical teaching.

Examples of Assessment Tools for Clinical Reasoning:
- Script concordance questions.
- Global rating assessment.
- Case-based discussion.

Student Learning Outcomes Specific to Clinical Reasoning:
- Effectively utilize clinical reasoning in diagnosis and treatment.
- Develop a rationale for appropriate referrals and/or collaborative care.
- Utilize outcome measures to substantiate care.
- Integrate the input of colleagues and patients in the clinical decision-making process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.
- Demonstrate the ability to manage uncertainty in the clinical decision-making process.
- Demonstrate the use of regular self-reflection in the clinical setting.

Expected Implementation: Spring 2010

Trimester 9

<u>Clinic III</u>
Course Description:
Building upon clinical skills learned in their initial trimester in Moody Health Center, interns continue to provide chiropractic care to patients under the mentoring and supervision of faculty attending clinicians. Interns are expected to refine their skills to meet the defined clinical competencies.

Intervention/Teaching Strategies:
- Self-directed, computer-based case simulations.
- SNAPPS model of clinical teaching.

Examples of Assessment Tools for Clinical Reasoning:
- Script concordance questions.
- Global rating assessment.
- Case-based discussion.
- OSCE format (CSCE II).

Student Learning Outcomes Specific to Clinical Reasoning:
- Effectively utilize clinical reasoning in diagnosis and treatment.
- Develop a rationale for appropriate referrals and/or collaborative care.
- Utilize outcome measures to substantiate care.
- Integrate the input of colleagues and patients in the clinical decision-making process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.

- Demonstrate the ability to manage uncertainty in the clinical decision-making process.
- Demonstrate the use of regular self-reflection in the clinical setting.

Expected Implementation: Summer 2010

Trimester 10

Clinic IV
Course Description:
This course comprises the final trimester in the clinical experience. Upon gaining a high level of clinical proficiency, the intern is afforded increased independence in treatment and case management while still working under the supervision of the faculty attending clinician. Upon completion of all qualitative and quantitative requirements for graduation, interns have the opportunity to participate in the hospital rotations program and/or in community preceptorships throughout the United States.

Intervention/Teaching Strategies:

- Self-directed, computer-based case simulations.
- SNAPPS model of clinical teaching.

Examples of Assessment Tools for Clinical Reasoning:

- Script concordance questions.
- Global rating assessment.
- SP encounters.
- Case-based discussion.

Student Learning Outcomes Specific to Clinical Reasoning:

- Effectively utilize clinical reasoning in diagnosis and treatment.
- Develop a rationale for appropriate referrals and/or collaborative care.
- Utilize outcome measures to substantiate care.
- Integrate the input of colleagues and patients in the clinical decision-making process.
- Identify common errors in clinical reasoning and provide strategies to avoid them.
- Demonstrate the ability to manage uncertainty in the clinical decision-making process.
- Demonstrate the use of regular self-reflection in the clinical setting.

Expected Implementation: Fall 2010

Implementation Timeline

Chart 4.1 provides a visual timeline of the implementation of the QEP throughout the curriculum. There is a dual track for implementation in the didactic classes and in the clinical experience. The QEP will be fully integrated into the clinics by Fall 2010 and total QEP implementation will be realized by Spring 2012.

Chart 4.1: Initial Implementation