integrated with plastic surgery in this clinic. During the second and third years, students rotate through the local children's hospital for the purpose of participating in the treatment of newborn to adult, a large number of patients are treated. Orthodontics is integrated with plastic surgery in this clinic.

ORTH 608 Craniofacial Anomalies Clinic III
Credits 0. 0 Other Hours.
During the second and third years, students rotate through the local children's hospital for the purpose of participating in the treatment of patients with a wide array of syndromes and craniofacial defects. From newborn to adult, a large number of patients are treated. Orthodontics is integrated with plastic surgery in this clinic.

ORTH 609 Craniofacial Anomalies Clinic IV
Credits 0. 0 Other Hours.
During the second and third years, students rotate through the local children's hospital for the purpose of participating in the treatment of patients with a wide array of syndromes and craniofacial defects. From newborn to adult, a large number of patients are treated. Orthodontics is integrated with plastic surgery in this clinic.

ORTH 610 Biomechanics I
Credits 0.5-1. 0.5-1 Lecture Hours.
5-1. Mechanical principles and biological factors affecting tooth movement, introduction to forces, statics, and dynamics, scalars and vectors, and analysis of force systems. Force and movement; basic concepts fundamental to an understanding of tooth movement.

ORTH 611 Biomechanics II
Credits 0.5-1. 0.5-1 Lecture Hours.
5-1. Mechanical principles and biological factors affecting tooth movement, introduction to forces, statics, and dynamics, scalars and vectors, and analysis of force systems. Force and movement; basic concepts fundamental to an understanding of tooth movement.

ORTH 612 Material Science in Orthodontics
Credits 0.5 to 1. 0.5-1 Lecture Hours.
5-1. Evaluation and utilization of dental materials used in clinical orthodontics.

ORTH 613 Advanced Cephalometrics
Credit 1. 1 Lecture Hour.
Advanced topics relating to the cephalometric technique are presented, including superimposition, growth and treatment prediction, treatment assessment, consideration of error, orthognathic surgery treatment planning, and image enhancement techniques.

ORTH 614 Orthognathic Surgery Conference I
Credits 0 to 10. 0 to 10 Other Hours.
This seminar/conference series involves the departments of Orthodontics and Oral and Maxillofacial Surgery in a multidisciplinary approach to the treatment of those patients with substantial craniofacial deformities. The course begins in the first year with a series of lectures/seminars on specific diagnostic and treatment procedures, followed by assignment of patients that will be supervised jointly by both specialties. Regular conferences are held to discuss pertinent literature, review patient progress, plan treatment and present completed cases. Each student is involved in all phases of treatment: presurgical orthodontics, the surgical procedure, finishing and retention.
ORTH 615 Orthognathic Surgery Conference II
Credits 0 to 10. 0 to 10 Other Hours.
This seminar/conference series involves the departments of Orthodontics and Oral and Maxillofacial Surgery in a multidisciplinary approach to the treatment of those patients with substantial craniofacial deformities. The course begins in the first year with a series of lectures/seminars on specific diagnostic and treatment procedures, followed by assignment of patients that will be supervised jointly by both specialties. Regular conferences are held to discuss pertinent literature, review patient progress, plan treatment and present completed cases. Each student is involved in all phases of treatment: presurgical orthodontics, the surgical procedure, finishing and retention.

ORTH 616 Orthognathic Surgery Conference III
Credits 0 to 10. 0 to 10 Other Hours.
This seminar/conference series involves the departments of Orthodontics and Oral and Maxillofacial Surgery in a multidisciplinary approach to the treatment of those patients with substantial craniofacial deformities. The course begins in the first year with a series of lectures/seminars on specific diagnostic and treatment procedures, followed by assignment of patients that will be supervised jointly by both specialties. Regular conferences are held to discuss pertinent literature, review patient progress, plan treatment and present completed cases. Each student is involved in all phases of treatment: presurgical orthodontics, the surgical procedure, finishing and retention.

ORTH 617 Orthognathic Surgery Conference IV
Credits 0 to 10. 0 to 10 Other Hours.
This seminar/conference series involves the departments of Orthodontics and Oral and Maxillofacial Surgery in a multidisciplinary approach to the treatment of those patients with substantial craniofacial deformities. The course begins in the first year with a series of lectures/seminars on specific diagnostic and treatment procedures, followed by assignment of patients that will be supervised jointly by both specialties. Regular conferences are held to discuss pertinent literature, review patient progress, plan treatment and present completed cases. Each student is involved in all phases of treatment: presurgical orthodontics, the surgical procedure, finishing and retention.

ORTH 618 Orthognathic Surgery Conference V
Credits 0. 0 Other Hours.
This is a seminar course in which senior orthodontic and oral surgery residents work jointly to diagnose and treatment plan patients who are anticipating combined orthodontic/orthognathic surgery treatment to correct a dental/skeletal imbalance. The diagnosis and treatment plan(s) will be presented to the residents from both programs as well as attending faculty for critique and evaluation.

ORTH 619 Orthognathic Surgery Conference VI
Credits 0. 0 Other Hours.
This is a seminar course in which senior orthodontic and oral surgery residents work jointly to diagnose and treatment plan patients who are anticipating combined orthodontic/orthognathic surgery treatment to correct a dental/skeletal imbalance. The diagnosis and treatment plan(s) will be presented to the residents from both programs as well as attending faculty for critique and evaluation.

ORTH 620 Orthognathic Surgery Seminar
Credits 0.5. 0.5 Other Hours.
Surgical rotations in Oral and Maxillofacial Surgery.

ORTH 621 Clinical Specialty Seminars I
Credits 0 to 3. 0 to 3 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 622 Clinical Specialty Seminars II
Credits 0 to 3. 0 to 3 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 623 Clinical Specialty Seminars III
Credits 0 to 3. 0 to 3 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 624 Clinical Specialty Seminars IV
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.
ORTH 625 Clinical Specialty Seminars V
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 626 Clinical Specialty Seminars VI
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 627 Clinical Specialty Seminars VII
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 628 Clinical Specialty Seminars VIII
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 629 Clinical Specialty Seminars IX
Credits 0 to 10. 0 to 10 Other Hours.
This series of courses is a companion to clinical training in orthodontics and involves faculty and student evaluation of historically significant as well as contemporary literature. In other sessions, lectures and seminars complement the clinic experience with topics including patient management, treatment of variously aged patients and types of malocclusions, and various types of orthodontic and orthopedic appliances. The students also are exposed to the historical development of orthodontics, additional treatment philosophies through guest speakers and new developments in treatment. Students present their cases through descriptions of diagnosis, treatment planning and treatment results.

ORTH 630 Advanced Orthodontic Practice Management I
Credits 0 to 2. 0 to 2 Lecture Hours.
This course considers the ethical approach to practice promotion and professional interactions in addition to the basic principles of office management. The latter include consideration of staff selection, office design, accounting methods, insurance considerations, inventory control and financial planning.

ORTH 631 Advanced Orthodontic Practice Management II
Credits 0 to 2. 0 to 2 Lecture Hours.
This course considers the ethical approach to practice promotion and professional interactions in addition to the basic principles of office management. The latter include consideration of staff selection, office design, accounting methods, insurance considerations, inventory control and financial planning.

ORTH 632 Principles of Scientific Methodology/Thesis Protocol
Credits 0.5. 0.5 Lecture Hours.
Basic precepts of research and the methodology off critical literature review in preparation of a research proposal.

ORTH 633 Scientific Writing
Credits 0.5. 0.5 Other Hours.
A series of courses designed to assist the student in the preparation of a research proposal, a proposal to secure extramural funding and the thesis. When the research is concluded, instruction is given to enable the preparation of a manuscript suitable for publication.

ORTH 634 Independent Research I
Credits 0 to 10. 0 to 10 Other Hours.
Activity related to definition of a research problem, searching the literature, conducting the research, analyzing the results and preparing the thesis.

ORTH 635 Independent Research II
Credits 0 to 10. 0 to 10 Other Hours.
Activity related to definition of a research problem, searching the literature, conducting the research, analyzing the results and preparing the thesis.

ORTH 636 Independent Research III
Credits 0 to 10. 0 to 10 Other Hours.
Activity related to definition of a research problem, searching the literature, conducting the research, analyzing the results and preparing the thesis.
ORTH 637 Independent Research-Manuscript Development I
Credits 0 to 2. 0 Lecture Hours. 0 to 2 Other Hours.
The course provides the guidance and time necessary for the residents to successfully complete the journal article summarizing the methods and results of their Master's research projects. Orthodontic residents should endeavor to publish their research projects. To that end, they need to know how to prepare their work for publication. Publication requires a good understanding of the IMRAD structure. By working closely with their mentors, committees and Dr. Buschang, the residents will learn how to outline the manuscript, prepare tables and figures, and write the text of the manuscript. This will be accomplished primarily by one-to-one interactions with Dr. Buschang.

ORTH 638 Independent Research-Manuscript Development II
Credits 0 to 2. 0 Lecture Hours. 0 to 2 Other Hours.
The course provides the guidance and time necessary for the residents to successfully complete the journal article summarizing the methods and results of their Master's research projects. Orthodontic residents should endeavor to publish their research projects. To that end, they need to know how to prepare their work for publication. Publication requires a good understanding of the IMRAD structure. By working closely with their mentors, committees and Dr. Buschang, the residents will learn how to outline the manuscript, prepare tables and figures, and write the text of the manuscript. This will be accomplished primarily by one-to-one interactions with Dr. Buschang.

ORTH 639 Independent Research-Manuscript Development III
Credits 0 to 2. 0 to 2 Other Hours.
The course provides the guidance and time necessary for the residents to successfully complete the journal article summarizing the methods and results of their Master's research projects. Orthodontic residents should endeavor to publish their research projects. To that end, they need to know how to prepare their work for publication. Publication requires a good understanding of the IMRAD structure. By working closely with their mentors, committees and Dr. Buschang, the residents will learn how to outline the manuscript, prepare tables and figures, and write the text of the manuscript. This will be accomplished primarily by one-to-one interactions with Dr. Buschang.

ORTH 640 Introduction to Orthodontics I
Credits 0.50 to 1.5. 0.50 to 1.5 Lecture Hours.
A course covering the basic topics related to the specialty of orthodontics. This series of lectures covers material presented in a textbook directed toward graduate education.

ORTH 641 Introduction to Orthodontics II
Credits 0.50 to 1.5. 0.50 to 1.5 Lecture Hours.
A course covering the basic topics related to the specialty of orthodontics. This series of lectures covers material presented in a textbook directed toward graduate education.

ORTH 642 Introduction to Orthodontics III
Credits 1 to 2. 1 to 2 Lecture Hours.
Courses covering the basic topics related to the specialty of orthodontics. This series of lectures covers material presented in textbooks directed toward graduate education.

ORTH 643 Introduction to Orthodontics IV
Credits 1 to 2. 1 to 2 Lecture Hours.
Courses covering the basic topics related to the specialty of orthodontics. This series of lectures covers material presented in textbooks directed toward graduate education.

ORTH 644 Introduction to Cephalometrics (Advanced Cephalometrics)
Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.
This course provides a thorough understanding of craniofacial radiographic techniques with emphasis on cephalometric roentgenography. This course is designed to acquaint the student with the use of X-rays, radiation hygiene, pathology and cephalometric techniques to assure proficiency in technical skills and in interpretation as needed for diagnostic procedures. This course includes both lecture and laboratory instruction.

ORTH 645 Craniofacial Growth and Development
Credits 1 to 1.5. 1 to 1.5 Lecture Hours.
5. The clinical implications of changes in craniofacial form and function are presented. A critical review of the literature is conducted relating knowledge of facial growth and clinical practice.

ORTH 646 Orthodontic Techniques
Credits 2. 2 Other Hours.
This offering includes basic preclinical exercises designed to prepare the student for clinical practice. A series of exercises are performed involving wire bending, soldering, impressions and model trimming, and the manipulation of acrylic. An edgewise course is conducted on typodonts simulating the treatment of various malocclusions.

ORTH 647 Clinical Orthodontics I
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patient with typical malocclusions and requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected as educational models. Techniques focus on standard edgewise technique including pretorqued and preangled brackets and lingual orthodontics.

ORTH 648 Clinical Orthodontics II
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patient with typical malocclusions and requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected as educational models. Techniques focus on standard edgewise technique including pretorqued and preangled brackets and lingual orthodontics.

ORTH 649 Clinical Orthodontics III
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patient with typical malocclusions and requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected as educational models. Techniques focus on standard edgewise technique including pretorqued and preangled brackets and lingual orthodontics.

ORTH 650 Clinical Orthodontics IV
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patients with typical malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected. Emphasis is on the edgewise appliances system with its many variations including pretorqued and preangled brackets, self-ligation systems and lingual orthodontics.
ORTH 651 Clinical Orthodontics V
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patients with typical malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected. Emphasis is on the edgewise appliances system with its many variations including pretorqued and preangled brackets, self-ligation systems and lingual orthodontics.

ORTH 652 Clinical Orthodontics VI
Credits 0 to 10. 0 to 10 Other Hours.
Diagnosis and treatment of patients with a broad variety of malocclusions. Patients with typical malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery, and interdisciplinary care are selected. Emphasis is on the edgewise appliances system with its many variations including pretorqued and preangled brackets, self-ligation systems and lingual orthodontics.

ORTH 653 Clinical Orthodontics VII
Credits 1 to 3. 1 to 3 Other Hours.
Clinical Orthodontics entails the core clinical education of the orthodontic program. Treatment of malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery and multidisciplinary care are selected as educational models. Clinical Orthodontics follows a structured, yet flexible, course outline to ensure that the resident becomes familiar with all aspects of contemporary clinical practice as presented by the various well-qualified clinical instructors. It is envisaged that no one treatment technique or philosophy will out rank another; a complete orthodontic education is of the essence. A broad range of appliance usage is taught ranging from removable appliances to the more sophisticated fixed preangled brackets and lingual orthodontics (018 and 022). The clinics include the screening of potential orthodontic patients, underling the importance of obtaining ABO standard clinical records, complete case diagnosis, case analysis, treatment techniques, individualization of appliances, evidence-based treatment procedures, a pursuit of ABO treatment outcomes, as well as proven retention protocols. Furthermore, the course also places an emphasis on the attendance of continuing in orthodontic private practice; a philosophy of continued learning is encouraged. This clinical course provides an opportunity to consolidate the basic principles of case analysis and treatment planning, communication between clinician and patient, as well as interaction between different specialties to ensure competency in multidisciplinary treatment. Planning for long-term esthetic, healthy, functional and stable treatment is the order of the day.

ORTH 654 Clinical Orthodontics VIII
Credits 1 to 3. 1 to 3 Other Hours.
Clinical Orthodontics entails the core clinical education of the orthodontic program. Treatment of malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery and multidisciplinary care are selected as educational models. Clinical Orthodontics follows a structured, yet flexible, course outline to ensure that the resident becomes familiar with all aspects of contemporary clinical practice as presented by the various well-qualified clinical instructors. It is envisaged that no one treatment technique or philosophy will out rank another; a complete orthodontic education is of the essence. A broad range of appliance usage is taught ranging from removable appliances to the more sophisticated fixed preangled brackets and lingual orthodontics (018 and 022). The clinics include the screening of potential orthodontic patients, underling the importance of obtaining ABO standard clinical records, complete case diagnosis, case analysis, treatment techniques, individualization of appliances, evidence-based treatment procedures, a pursuit of ABO treatment outcomes, as well as proven retention protocols. Furthermore, the course also places an emphasis on the attendance of continuing in orthodontic private practice; a philosophy of continued learning is encouraged. This clinical course provides an opportunity to consolidate the basic principles of case analysis and treatment planning, communication between clinician and patient, as well as interaction between different specialties to ensure competency in multidisciplinary treatment. Planning for long-term esthetic, healthy, functional and stable treatment is the order of the day.

ORTH 655 Clinical Orthodontics IX
Credits 1 to 3.
Clinical Orthodontics entails the core clinical education of the orthodontic program. Treatment of malocclusions requiring early treatment, dentofacial orthopedics, orthognathic surgery and multidisciplinary care are selected as educational models. Clinical Orthodontics follows a structured, yet flexible, course outline to ensure that the resident becomes familiar with all aspects of contemporary clinical practice as presented by the various well-qualified clinical instructors. It is envisaged that no one treatment technique or philosophy will out rank another; a complete orthodontic education is of the essence. A broad range of appliance usage is taught ranging from removable appliances to the more sophisticated fixed preangled brackets and lingual orthodontics (018 and 022). The clinics include the screening of potential orthodontic patients, underling the importance of obtaining ABO standard clinical records, complete case diagnosis, case analysis, treatment techniques, individualization of appliances, evidence-based treatment procedures, a pursuit of ABO treatment outcomes, as well as proven retention protocols. Furthermore, the course also places an emphasis on the attendance of continuing in orthodontic private practice; a philosophy of continued learning is encouraged. This clinical course provides an opportunity to consolidate the basic principles of case analysis and treatment planning, communication between clinician and patient, as well as interaction between different specialties to ensure competency in multidisciplinary treatment. Planning for long-term esthetic, healthy, functional and stable treatment is the order of the day.

ORTH 689 Special Topics In...
Credits 0 to 4. 0 to 4 Other Hours.
Selected topics in an identified area of orthodontics. May be repeated for credit.

ORTH 691 Research
Credits 0 to 10. 0 to 10 Other Hours.
Research for thesis or dissertation.