The two-course sequence PHYS 424-425 is not presently offered. Instead, PHYS 425 has become a stand-alone course, dealing mostly with material that had been covered in PHYS 424. The following is a list of topics that I hope to cover this term.

**RAY OPTICS**  
Fermat's Principle and its application to various optical elements  
The Paraxial Approximation  
Ray Transfer Matrices and applications to various optical situations

**OPTICAL RESONATORS**  
Stability conditions for various resonator configurations

**RAY TRACING**  
Some general principles and use of a simple ray-tracing software

**REVIEW OF ELECTROMAGNETIC WAVES**  
Derivation of the Electromagnetic Wave Equation for free-space and dielectric media  
Introduction of the "quantum optics" notation for complex electromagnetic field solutions  
Plane waves and vector plane waves

**INTERFERENCE AND INTERFEROMETERS**  
Superposition of plane waves  
Mach-Zehnder interferometer  
Stokes Relations  
Michelson interferometer  
Sagnac interferometer

**PARAXIAL WAVE EQUATION AND GAUSSIAN BEAMS**  
Paraxial approximation for the wave equation  
Gaussian beams  
The ABCD Law for Gaussian beam propagation  
Application of the ACD Law to propagation through various lens and mirror systems
HERMITE-GAUSSIAN BEAMS
Beams with transverse mode structure

FABRY-PEROT (PLANE MIRROR) CAVITIES
Resonance condition
Cavity damping, finesse and Q
Optical spectrum analyzer

SPHERICAL MIRROR CAVITIES
Gaussian modes and resonant frequencies

POLARIZATION
Polarization ellipse
Special cases of the polarization ellipse linear, circular polarization etc.
Polarization states, Jones Vectors
Polarization devices: polarizers, retarders, rotators etc.
Birefringence
Optical activity, the Faraday Effect

THE FRESNEL RELATIONS
Propagation of electromagnetic waves through interfaces
Brewster angle etc

IF TIME PERMITS...
More optical devices, possibly non-linear optical devices