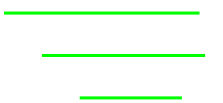

öüØßü œê 6 îü÷ŒE
üß œêà ýüüÖ łöÖ łœe üÖ ý
aœÖ÷îß œêà ýüüÖ łöÖ łœe üÖaý÷Ö3 îü÷ŒE
ł ÿüß ß üß Ý î üî ûî÷ŒEï ł ÷ ðäïŒEýÖp ØÑ÷ŒE)î Ü
105105 üí ô îdœEöîdŒE 3(3-0-6)
(Finite Element Methods)
105301 Ö ł Ùl üŁÜŒKœ ×ì ÜóœeÝ ÿœŒE łœaî Ùü öł 3(3-0-6)
(Computational Fluid Dynamics and Heat Transfer)
105603 Ö ł Ö ï ï Ö ý÷ î ïÿØ ö ÿöì 3(3-0-6)
(Optimal Aircraft Design)
105605 Ö ł Ùüöì Ù Ü Ö ý÷ÝÜî × 3(3-0-6)
(Advance Flight Control)
105606 łœe ÖÝŒE 3(3-0-6)
(Aeroelasticity)
105607 Ł óœe ýdÿÖŒE łÖ ÿÜ× 3(3-0-6)
(Advance Aerothermodynamics)
105608 Ö ł ü Ü âæ îÜ×ý Ü Ö ý÷ î 3(3-0-6)
(Aircraft Trajectory Planning)
105609 Ö ł Ö ï ïØœä ÜÝ àłÜÖœe Ü Ùî 3(3-0-6)
(Aircraft Structural Layout and Design)
105610 ÿ ì ł ØÖýä ÿÖ 3(3-0-6)
(Advanced Astrodynamics)
105611 Ö ł ï×Ø× ÜÝł üØ 3(3-0-6)
(Rocket Propulsion)
106202 ł ï ï Ùüöì Ùl ï ö ÿØöì 3(3-0-6)
(Optimal Control Systems)
106203 ł ï ï Ùüöì Ùl ï ‘ ñ Ö3 ãÿ 3(3-0-6)
(Nonlinear Control Systems)
106303 Ö ł œe Øï î 3(3-0-6)
(Viscous Flow)
106305 ì ø þ× ª Ü ïdüł œdî à 3(3-0-6)
(Theory of Turbulence)
106601 Ö ł Ùüöì Ö łï ï ïÝÞł÷ 3(3-0-6)
(Intelligent Flight Control)
106602 Ö ł Ö ï ï Öî ýÿ÷ î × 3(3-0-6)
(Advanced Aircraft Design)
106603 ł ï ï Ö ý÷ î œ ÷œ 3(3-0-6)
(Multiple Aircraft Systems)
106997 ł ÜØ Þó àî ýüÖ łÖ łœe 1üÖ ý 3(3-0-6)
(Selected Topics in Aerospace Engineering I)
106998 ł ÜØ Þó àî ýüÖ łÖ łœe 2üÖ ý 3(3-0-6)
(Selected Topics in Aerospace Engineering II)

üß œëü ð

aœÖ÷ífß œëü ðîäö÷Ö3 îü÷ÖÐ ØVÿ î îß ÙüÌ oË÷ífß î Öı ßÙü î Ì ØíĿ æÐÖþ àÜ ØVÿ î ı ÷ ïî÷ë÷eü Ù îóÌœÝ÷öaÖbœeî Ù Ì ûœe Ì ÿº îïØ öÖþ î ì ØVÖ÷ìÌ Üaðüß îÖþÐÈ÷œaÜÐÈZÙü öî ß ï Ý Öıß ÙÜî

æ îÖÖbý

æ ÖÜ ï ïÖ2

ðX1 ı ÙÖ ÐÖý ì1

Ì ÿüß	ß üß	Ý î üî ûî÷ÖÐ
105090	ÙĿŒ ý öýÖÐÖ÷Ì ûÜüß Ì dœ ÜÖÐß œ ×	3(3-0-6)
	(Analytical and Numerical Engineering Mathematics)	
105102	Öœe ý øýÖÐÖÝ‘Ì ûÖÐÜ	3(3-0-6)
	(Continuum Mechanics)	
105613	Ö ýóœ øf ýÖŒ Ì	3(3-0-6)
	(Advanced Aerodynamics)	
105996	ÿööî	1(0-3-1)
	(Seminar)	
	Ì üö	10(9-3-19)

ðX1 ı ÙÖ ÐÖý ì2

Ì ÿüß	ß üß	Ý î üî ûî÷ÖÐ
105602	Ö Ì üÙ Ì dÙ Ì üaÿÜ Ö ý÷ î	3(3-0-6)
	(Aircraft Structural Analysis)	
105612	óœ ý dÿœÐÈ Ì Ö Ì ûÙüïÜÖî Ì ï	3(3-0-6)
	(Dynamics and Control in Aerospace)	
105995	ŒÐdÙ÷ ðî íd	2(1-2-3)
	(Thesis Preparation)	
105999	üì ÷ ðî íd	3
	(Thesis)	
	Ì üö	11(7-2-15)

ðX2 ı ÙÖ ÐÖý ì1

Ì ÿüß	ß üß	Ý î üî ûî÷ÖÐ
10xxxx	üß œëü ýÜüÖ Ì öÖî Ì öœe üÖ ý	3(3-0-6)
	(Aerospace Engineering Elective)	
xxxxxx	üß œëü ð	3(x-x-x)
	(Free Elective)	
105999	üì ÷ ðî íd	3
	(Thesis)	
	Ì üö	9(3-0-6)

ðX2 ı ÙÖ ÐÖý ì2

Ì ÿüß	ß üß	Ý î üî ûî÷ÖÐ
105999	üì ÷ ðî íd	6
	(Thesis)	
	Ì üö	6

Ù ï ÷ł ßü

105090 ÙŁŒ ý ŭýŒËÖł üÙßÙł dœ ÜŒBœ × 3(3-0-6)

(Analytical and Numerical Engineering Mathematics)

üß ÙÙÜÖî : Ø ÷ÙüîßÙ ï × ÜßÙü

Prerequisite : Department Permission

Öł ýŕîd ÜŒý ŭŒï ł œ ×ŕÝÙł ŭýßÙŁŒßÙŁŒÜß ýÖ œŒe ł ÖàŒËÖ Œ ł ÿ öŒÙœýÙł ÜÖ ł îßł æ óœÜŒØ œBØ× Ù ïœÊîü ÷ì ÜŒËÊœè éÖ ł ‘æ œ ÿªł ı Ù Œ ÜŒßœ ×× Ùýôî ł ÷ÙÔ ł œß ô æŒÊô ł üîà ô îœËöîŒ üï ïØi œöîŒ

Mathematical proofs, Number systems, Algebra, Vector and matrix, Vector spaces, Calculus of Variations, Numerical error, Discretization, Convergence and stability of scheme, Numerical solutions of partial differential equations, Weak formulations, Finite difference methods, Finite-element methods, Boundary-element methods.

105102 Öœ ý ŭýŒËÿł ‘ł ŒÜ 3(3-0-6)

(Continuum Mechanics)

üß ÙÙÜÖî : Ø ÷ÙüîßÙ ï × ÜßÙü

Prerequisite : Department Permission

óøÖŒ öœ ÖÿŒe óÖœ Ùÿ ŒÜ ö ÷ ì îł æ łÙü ö ÷Ø ŸØ ì î æł ÙÜü ë Ø Ù ÙüöŕßÙ ÜłxŒËÿÙL ü Ù öł ŒËÿöÖł Ùü öîŒËÿöÖł Öł îÙœe ÿı œeÿöØ ì î æł ÙÜü âö œè ÖÿŒe ì ÷ œßÖ ð ÝÖ× ÿÙÖł ÿöö ŒÿŁØ× ÎÙü àXì ł ð ôfÙÖŒł Ùü â×Ù Ü ÿł ü Ùł üÖŒËÙœè Ø ÷ Œ ö Ùœł ÙÖŒ þªó ì î÷ œß óœÊÿöÖŒ Ù îÿìì ô× ÜÙü îñœæ ÖÿŒÙ Ø÷ î ÷ ï ‘ ßÙâÿÿØÿ Ùœe ÖÿŒÖ łå î × ÜÖ ł œ ï ïÿÙÿ

Elastic-plastic behavior; Tensor notations, Strain tensors; Geometric nonlinearity; Compatibility conditions, Continuity equation; Equation and equilibrium; Stress tensors; Elastic potential, principle of material objectivity, symmetry; anisotropy AIRY's stress function; Yield conditions, Ductile behaviour; Plastic potential theory; Constitutive equations, plasticity; Non-linear elasticity, Viscoelastic materials; Basic equations of viscous flow.

105105 üí ô îœËöîŒ 3(3-0-6)

(Finite Element Methods)

üß ÙÙÜÖî : Ø ÷ÙüîßÙ ï × ÜßÙü

Prerequisite : Department Permission

î üÙüØ ÖÙł üÙł üÙ öÜŒËöŒÖæÙü öÜŒËÿ ł ł üöðł Ö ÜÿíÖł Œ ï Ö ł ðł ÖŒËÖŒÊÙ Ü î Ùæ ÜÿŁœe ‘ ÷ł Ù× îœËöîŒ ł Ö ł üł œ ý ŭýŒËÖæÙü œe (Ù îÿà ì î œðŸðæe Ù Ö ł üöŒËÖæÙü öÜŒËÿ ł Ù îœöîŒ ô îœËöîŒÜÿ ł Œ î Ü ï Ø÷ î ÷ôÜŒł ÷ ŒØÙÝ ł Ø ł ÜŒł ÷ŒØÝŒÖł ÜŒł ðł ‘ ÜŒØî œöîŒÊâÿÙü Ø ł Ö œeüîŒ

The concept of stiffness analysis, Stiffness matrix for assembly of springs; Solution procedure; Applications to frameworks and trusses; Finite element methods for dynamic analysis; Mass matrices (consistent), Generalized eigenvalue problems; Stiffness matrix for beam elements, Finite element continua; Displacement functions; Stresses, Strains, Nodal displacements, Shape functions; Area coordinates; Linear, quadratic, cubic elements.

105301 Ö ł Ù ü Ł Ü Œ œ × ì Ü ó d e Ù ý ÿ Œ Ł o a î Ù ü ö ł 3(3-0-6)
(Computational Fluid Dynamics and Heat Transfer)
ü ß Ù Ù Ö î : Ø ÷ Ù ü î ß ï × Ü ß Ù ü
Prerequisite : Department Permission
ó î å î ÿ ö Ö d í é ÷ Ö ł Ý î Ö ÿ ö Ö d í é ÷ ÿ ı ü × ï × Œ Œ Ö d ó ł d ï ï ô
î Œ ô ł Ù Ł ÿ à ì î à ÿ ª ł ı Ö ł ‘ œ ú Ö ł Ù ü Ł à ÿ ł ÿ ö Ö ł ó î ÷ d Ù ã Œ Œ e œ Þ œ ÷ × Ü
ÿ ö Ö ł ó î í d ł Ö œ e d ï Œ ł
Fundamentals of partial differential equation, Classification of partial differential equat
Initial and boundary conditions, Derivation of finite difference expressions, Consistency, St
Convergence, Iterative methods for elliptic equations, Solution of parabolic
hyperbolic differential equations.

105602 Ö ł ü Ù ł d Ù ł Ü à ÿ Ù Ö ý ÷ î 3(3-0-6)
(Aircraft Structural Analysis)
ü ß Ù Ù Ö î : Ø ÷ Ù ü î ß ï × Ü ß Ù ü
Prerequisite : Department Permission
Ö ł ü Ù ł d Ö ý ÷ Ö î ł a Œ Ö ł Œ ü ÿ ö Ö ł ì œ Ù Ÿ Ö Œ ł ð ł Ö Œ ß ÿ ü î Ù ł à ÿ Ù ł
Ö ý ÷ ß Ù î Ö ł Ø Ù ł à ÿ Ù e ï Ù à e ï Ö Œ e ß ú Ö ł ü Ù ł ì d Ü ô d e ß Œ d Œ Ü ß Œ
Aircraft structure analysis, Fatigue, Fracture, Elasticity, Applications to air
structural elements, including beams, thin walled structures, plates, buckl
Introduction to Finite element analysis.

105603 Ö ł Ö ï ï Ö ý ÷ î ï ÿ Ø ö ÿ ö ì 3(3-0-6)
(Optimal Aircraft Design)
ü ß Ù Ù Ö î : Ø ÷ Ù ü î ß ï × Ü ß Ù ü
Prerequisite : Department Permission
ü í Ö ł ‘ Ù ö ÿ Ø ì î Ö ł Ö ï ï ÷ Ö ý Œ ł î ÿ ö × î Ö Ø Œ ł ‘ ü Ö
Ù ü ö ÿ Œ e ÿ ö ł Ù ü î ö ÿ Ø Ù Œ a Œ × î Ø × ÷ Ü ı ÿ Ö ł Ù ü ö Ù e Ù Ù Ö ł
Ö ï î ß ü î Ö ý ÷ î
Optimization techniques in design of aircraft, Size Determination, Selectio
configuration, weight, balance, and performance, Stability, control, and hand
qualities requirements, Aircraft component Design.

105605 Ö ł Ù ü ì Ù Ü Ö ÿ î ÷ Ù î × 3(3-0-6)
(Advanced Flight Control)
ü ß Ù Ù Ö î : Ø ÷ Ù ü î ß ï × Ü ß Ù ü
Prerequisite : Department Permission
× Ö î Ø × Ü ÿ ö ł ł º î Ù ł × ì ø ß Œ ł Ù ü ö Ù ï Ü ß ÿ Ö ª Ö ł Ù ü ö ÿ Ù ł ł ï ï Ù î
Œ Œ Ö ł Ù ü ö Ù ï Œ ð ł œ ì Ö ÷ Œ e Œ Ø Ù ü ö Ù Ö ł Ö ü Ù Œ ß Ù ï ÿ Ø e Ö ł a ß
Ù ö ó Œ a ß ÷ î Ö ł Ù Ù ü Œ
Specifications of aircraft performance, Control theory, Autopilot control la
Multivariable control methods, Reduced-order synthesis, Digital design, Use of
computer-aided control design packages.

105606 ‹e ÖýŒE 3(3-0-6)

(Aeroelasticity)

üß ÜÙÜÖî : Ø ÷ÙüîßïÞ × ÜßÙü

Prerequisite : Department Permission

ÿºŒE ý ÿöŒE‹óœ‹ý ÜýŒE‹œ ÖýŒEÜÖ‹ ìì Ü Ö ýóœ‹ýÖýŒE‹œ‹ý ÜýŒE
Ö‹üÙ‹ ØÖ‹Ö‹ ×ó ÜßØØ œ‹ØîõîÞ ı ü Ö‘‹ÜúôÊ‹ŒEÙ‹ ìd Ü œ‹ ÖýŒE‹
Ý œ Ü× Ü düœ‹ àýŒE Ö‹ÙüïÙ

Static and Dynamic aeroelastic Aerodynamic loading, unsteady aerodynamics, f
analysis of fixed wings and rotary wings under various flow conditions, analytical metho
aeroelasticity, aeroservoelastic modeling, and active control.

105607 Ł óœ ýdÿÖŒE‹Ö ýÜ× 3(3-0-6)

(Advanced Aerothermodynamics)

üß ÜÙÜÖî : Ø ÷ÙüîßïÞ × ÜßÙü

Prerequisite : Department Permission

Ö ýóœ‹ýÜÖŒE‹œ Ù ö ó‹ÿÙ‹à÷ØÖŒE Ö‹üÙ‹ ª‹ÝØ‹ Ö‹Ø‹ÿö‹‹º î × Ü
ðÖ‹ØÖ‹ Ö ï ïÜ‹‹dŒEÜßŒE ðì ðÙ‹Ü× ÜÙÙ‹îdŒE

Aerodynamics of turbines and compressors, Aircraft gas turbine engine, cycle ana
Component performance measures, Preliminary design, Variable geometry engines

105608 Ö‹ü Ü âæ‹ îÜ×ÿ Ü Ö ý÷ î 3(3-0-6)

(Aircraft Trajectory Planning)

üß ÜÙÜÖî : Ø ÷ÙüîßïÞ × ÜßÙü

Prerequisite : Department Permission

Ö‹ü Ü æ‹ñ×ïŒE ‹ëaÖ îØ ×âaÙ ÜýÿÞ‹ Ö ý÷ÖîÞ‹Ùüñ Ù Ö ý÷ îaó
Øî ÜŒEâaìöÜØ îØÖ‹Ý‹œ Ü ïØÖÞ‹ü Ü âæ‹ îÜýóaðî ðŒ\öö ðÊî îØ
œ ÿaØÖÙœ‹ý‹ÿÜŒE‹Ö ýÊñ ‘ Ù ö ÿö îÖ‹üßÞ×Ù‹ æ‹ïî üÜÖ‹ ô
Ö îØÖ‹ŒE‹ñœ‹ÜÖ‹Ùüñ Ý‹ì Ü‹Ö‹ÿóî œ‹ï÷Ù‹œ ÙüöŒE
÷Ü÷ Ö× Ü‹ ï ï

Hierarchical planning, Restrictions in trajectory, Waypoint control of aircraft,
Trajectory planning to achieve required aircraft dynamics taken into account, H
modeling, Optimization techniques such as graph algorithm, dynamic progra
Air Traffic Control Introduction to ATM System and its complexity.

105609 Ö‹ Ö ï ïØöœ‹ Ü‹ý‹àÜÙÙ‹ Ü Ùüî 3(3-0-6)

(Aircraft Structural Layout and Design)

üß ÜÙÜÖî : Ø ÷ÙüîßïÞ × ÜßÙü

Prerequisite : Department Permission

×aÖ îØ œê ×Ù‹Ö‹ Ö ïäÜ×Ù‹ÜÙÙ‹Ùü öðœ÷ ØÖîÞ‹ï ‹Ö‹ ìÖ
Ù‹Üî î×Ł Ö‹îï ‹ î×ŁÖ‹îï îìì ÜÖî‹ŒEı ‹ ìØ Ý ÖÙüæöæê × Ü‹ýı ó
Ö‹ıý‹ î×Ł Ö‹‹îœ Ü œ‹ï îÙöœ‹ Ö‹ Ö ï ïØöœ‹ Ü‹ý‹àÜÙÙ‹ Ü‹Ø‹ óî Ü
‹ Øœ óîÜÖ‹Ù‹ŒEü Ü àÜÙ‹ýÙ‹œ ÙüÖ‹ Ö ï ïàÜÙÙ‹ïÊØ‹åaÖœ‹
Ù îü Ł Ö‹ îØ ×î ØaÜÙ‹Ù‹œ Ü‹ý‹ð‹ Ö‘ÜÖ‹ Ü Ùüî

Structural design requirements, Airworthiness, Flight loading, Flight maneuver lo
Atmospheric turbulence loads, Gust loads, Wing, Horizontal and vertical stabilizer layouts,
Fuselage structural layout, Landing gear layout, Initial sizing of structural components.

105610 ÿ ìł ØÿîÛÿö 3(3-0-6)

(Advanced Astrodynamics)

üß ÙÜÙÖî : Ø ÷ÙüîÛß ï × Üß Ùü

Prerequisite : Department Permission

Ù æ'œÜ×ŒÜæ œ Þœî ü-łÝÜØŒÖ œÖÙł ðł ö ÜŒ ŒÖ×ł Ýœ ãÜð óœŒ ü× Ü ÙłÜî ðå ÙöŒÿ ł üÜ ÙÝł ÿŒüÜÜ ł ÿÖÖ ł Ùððœ Ù× ï × ÜüÜ ÙŒ ÿ Üü üÖ ł ÿÖÖ ł œ öüÜ ÙÝłîßÙð œîüÖ ł óìłdïîßüÖ łÜŒ œÖ×ł ðł ö Ł Œ Ü œ ÙüØ÷üł ÜŒ

2-body orbital initial-value problem, Solving Kepler s equations, 2-body orbital boun value problem, Solving Lambert s problem, Non-Keplerian orbits, Perturbation metho Numerical methods, Statistical methods for position and velocity estimation

105611 Ö łï×Ø× ÜÝł üØ 3(3-0-6)

(Rocket Propulsion)

üß ÙÜÙÖî : Ø ÷ÙüîÛß ï × Üß Ùü

Prerequisite : Department Permission

Öœ ý ÿŒ łœ łïØ× ÜÝłüØîïï ÷ î œ Ö'üØ łœÖüłîå î × ÜÖ ł× Ø Øãßßóœ× œ óœ ółüØßü Ùłü Ùłôô œ \ ôÖïłØ×

Flight mechanics and propulsion system for interplanetary flight, Basic princ of solid and liquid chemical rocket propulsion, Nuclear-electric power and E rocket propulsion.

105612 óœ ý ÿŒ łÖ łüÙüïÜÖîłï 3(3-0-6)

(Dynamics and Control in Aerospace)

üß ÙÜÙÖî : Ø ÷ÙüîÛß ï × Üß Ùü

Prerequisite : Department Permission

ÿöÖ ł Ùœâ ÿ Œö ïïØÖ ł ðœØÜóï ï -Ùüœìłdî-îÿöÖ ł öłöÜŒ ÷ œàîł dœüŒâŒß ÜÖîłïÿºłı óÖîïìüîìØÖþªÙüŒ Œö ïïÝœ Üóœýÿ Œłý œ üÖ ý÷ÖîüÜŒÙó ó ÿºłı óì ÜÖ łï

Three dimensional equations of motion, coordinate systems. Euler s transforma Quaternion, Sensors and Actuators, Review of automatic control the Dynamical models of aircraft and spacecraft, Control stability augmentation syste

105613 Ö ýóœ ýÿŒ ł 3(3-0-6)

(Advanced Aerodynamics)

üß ÙÜÙÖî : Ø ÷ÙüîÛß ï × Üß Ùü

Prerequisite : Department Permission

óîå î Öœ Ö ýóœ ÿŒ ł Ö Ø ÙłÜîðœ ý ÿŒ ł œ üî œÜØüŒØ ÿâœ pÙd ü ÖØ ÙłÜî Ö ł œØüŒöØîó î Ö ÿ œØüŒöØî Ö ł œ ïïÙü ÖŒÜÙü ü ÿÜ× ØÖ ł œ ïïÙüîÙüł ü ÿÜ× ØØ ïïÖü ØÜâ× Ö łüÙł dßŒ œ ×ì Ü Ö ýóœ ÿŒ ł

Fundamentals of airfoil and wing aerodynamics, Compressible potential Vortex dynamics, Wing nomenclature, Incompressible flow past airfoils, Incompressible flow past wings, Wings in subsonic flow, Wings in supersonic flow, Numerical analysis of the aerodynan configurations, Swept wings, airplanes.

105995 Œ ëdüù÷ õîíd 2(1-2-3)

(Thesis Preparation)

üß ÜÙÜÖî : 105999 ÿööî

Prerequisite : 105996 Seminar

îÖÝÖp ÝaÜŒ ü×aû÷ õîíd ŒÜŒ Ýùð×Öp ù÷ õîíd œ Ö ÷aÙÙæ œëöÙ ÜÖ î ü×aìýÖp œëÙÙÿØÝú ñð ł ÿà îù÷ õîíd ÖÝÖp Ý÷î×a ËüÜÖÖ łaßÙ î×aœë÷ × üÿ łìÙÙ îÖ ł×î × Öÿ łÜł×îìì ËüúÝ ÿdŒËÖł×î ÿî‘ ÝŒí łÖ ł‘æß îÖÝÖp Ý æŒÜÖ łÿ ïîÿîü×aû÷ õîíd ł ÿÙł ÷Ü îÙaüüäÖîÖ ł÷ÜŒ÷ł õîíd

Students must obtain their thesis titles and thesis advisors. Do literature review area of study and conclude to main objectives. Learn to use information techn Techniques on writing of scientific papers. Oral presentation to community. To finis course, students must submit for their reports on their progress on thesis prepara

105996 ÿööî 1(0-3-1)

(Seminar)

üß ÜÙÜÖî : Ø ÷Ùûî ßïß × Üıß Ùü

Prerequisite : Department Permission

îÖÝÖp ÝaÜŒ a ßÜïł ł÷ æe ÷î × ÷Ü ïî÷ł ÝŒ üäaïł ł÷ ÷î îłßî ÖÝ Öäe îÖÝÖp aŒïł ł÷öëîÿ ûü×aÜÝ÷ðÝÝî

Attend to the lectures and prepare the reports. Present themselves currently research topics.

105999 üì ÷ õîíd 12

(Thesis)

üß ÜÙÜÖî : 105999 ÿööî

Prerequisite : 105996 Seminar

îÖÝÖp ÝaÜŒ ü×aû÷ õîíd ŒÜŒ Ýùð×Öp ù÷ õîíd œ Ö ÷aÙÙæ œëöÙ ÜÖ î îü×a

Research on an interesting topic in engineering, in which the candidate m arrange a public seminar at least one week on the selected topic before the oral examina taking place.

106202 ł ïïÙüöÙï ö ÿØöì 3(3-0-6)

(Optimal Control Systems)

üß ÜÙÜÖî : Ø ÷Ùûî ßïß × Üıß Ùü

Prerequisite : Department Permission

ðâ Ö ł‘ Ùö ÿØöìÿł ł ïïì Üóœðßßÿ ÙŒÙï ö ÿö î õîíüł×ßØ Œ ÙüïõÙïï ö ÿö ïîÙßŒ ÖØŒÊ ðÙ Ü ÜÙöœe ýdÿŒî×ÖdßØ\ÿÙ ÖŒ ïï ö ÿö

Optimization problems for dynamic systems, Discrete time optimum controllers, Contin time optimum controllers, Tracking problems, Dynamic programming, Random proc Optimum observers.

106203 ไม่เชิงเส้นในระบบควบคุม 3(3-0-6)
(Nonlinear Control Systems)
วิชาบังคับก่อน : ได้รับอนุญาตจากภาควิชา
Prerequisite : Department Permission
ระนาบเฟส การวิเคราะห์เสถียรภาพ ทฤษฎีไลอาปูนอฟ ฟังก์ชันอธิบาย การทำให้เป็นเชิงเส้นแบบป้อนกลับ การควบคุมแบบสไลดิ้ง การควบคุมแบบทนทาน และบทนำสู่การควบคุมอัจฉริยะ
Phase plane analysis, Stability in the sense of Lyapunov, Lyapunov theorems, Describing function, Feedback linearization, Sliding control, Introduction to robust control, and Introduction to intelligent control.

106303 การไหลหนืด 3(3-0-6)
(Viscous Flow)
วิชาบังคับก่อน : ได้รับอนุญาตจากภาควิชา
Prerequisite : Department Permission
คำตอบที่แน่นอนของสมการนาเวียร์-สโตกส์ ทฤษฎีชั้นขอบ เรย์โนลด์ส สเตรสและความปั่นป่วน การไหลภายในและการไหลชั้นขอบ การประยุกต์ใช้กับการถ่ายเทความร้อนและมวล และการไหลที่มีปฏิกิริยาเคมี
Exact solutions of Navier-Stokes equations, boundary-layer theory. Reynolds stresses and turbulence; internal, and boundary layer flows. Applications to heat and mass transfer and to chemical reacting flows.

106305 ทฤษฎีความปั่นป่วน 3(3-0-6)
(Theory of Turbulence)
วิชาบังคับก่อน : ได้รับอนุญาตจากภาควิชา
Prerequisite : Department Permission
แนวคิดของความปั่นป่วน การเปลี่ยนแปลงและทฤษฎีเสถียรภาพของการไหล การทดลองและการสังเกตความปั่นป่วน การผลิตพลังงานจลน์ความปั่นป่วน การกระจายพลังงานความปั่นป่วน การอธิบายความปั่นป่วนทางสถิติ ความเค้นเรย์โนลด์สและความเค้นความปั่นป่วน การปิดสมการโมเมนตัมเฉลี่ยและพลังงานจลน์ความปั่นป่วน การไหลเฉือนความปั่นป่วนอิสระและความปั่นป่วนที่ผนัง
Concept of turbulence, Transition theory of flow stability, Experimental observations on turbulence generation, Turbulent energy distribution, Statistical description of turbulence, Mean turbulent and Reynolds stress closure models, Turbulent shear flows in free turbulence and wall turbulence.

106601 การบินอัจฉริยะ 3(3-0-6)
(Intelligent Flight Control)
วิชาบังคับก่อน : ได้รับอนุญาตจากภาควิชา
Prerequisite : Department Permission
ทบทวนอากาศพลศาสตร์ ความเสถียรภาพสถิต ทบทวนการบินสามมิติ สมการการเคลื่อนที่ แบบจำลองไม่เชิงเส้นและการหาเสถียรภาพ แบบจำลองเชิงเส้นโดยประมาณ แบบจำลองลมกรรโชก ระบบเพิ่มเสถียรภาพ ระบบควบคุมและองค์ประกอบ ลักษณะเฉพาะ การควบคุมอัจฉริยะและการประยุกต์ใช้กับการควบคุมการบิน
Aerodynamics Review, Static Stability Reviews, Three Dimensional Aircraft Equations of Motion, Nonlinear Model and Stability, Linear Model Approximation, Wind Model, Stability Augmentation System, Control System Components, Servo Characteristics, Intelligent and its Application on Flight Control.

106602 Ö ł Ö ï ï Öî ý ÷ î × 3(3-0-6)
(Advanced Aircraft Design)
üß ÜÙÜÖî : Ø ÷ Ùûî ßï × Üıß Ùü
Prerequisite : Department Permission
ì ÙÜÖ ł ‘ ìÙ ö ÿö î Ö ł Ö ï ï Ø ł ÷ ðŒ Vöö ðÊ î Ø Ö ł Ö î Ø × î Ø
ï ï æê î ßÖ œ Ù ü œ ÿ ł Ø Ù ł ÿ ö ł º î Ö ł ÿ ÷ ı ó œ ì ð ł ý î Ö ł Ö ł ü Ù ł d
Œ ì î Ö ł Ö î ÿ üß Œ Ü × Ü Ö ý ÷ î
Optimization techniques in Design of a Modern Aircraft, Size Determin
Configuration, Weight and Balance, Performance, Stability, Control, and Hand
Qualities Requirements, Aircraft component Design.

106603 ł ï ï Ö ý ÷ î œ ÷ œ 3(3-0-6)
(Multiple Aircraft Systems)
üß ÜÙÜÖî : Ø ÷ Ùûî ßï × Üıß Ùü
Prerequisite : Department Permission
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ð × î Œ Ö ł Ý œ Ü ï Ø Ö ł ÿ à Ü ð Ù ö ÿ Ø î ő Ü æ ł ý ï ö ó î œ ö Ø ÷ Œ
× ï ü î Ö í ł û Ö ł ‘ ì Ù ö ÿ ß ú Ö ł à Ù ì Ü Ü ú Ö ł ï ï ð ł ö Ł
The Importance of Multi-Vehicle Systems with Complexity, Applications of the Syst
Hierarchical Structure, Hybrid Modeling, Problem Formulation, Algorithm
Optimization such as Graph Search and Approximated Algorithms.

106997 ł Ü Ø Þó à î ý Ü Ø ł ö Ö ł œ e 1 Ö ý 3(3-0-6)
(Selected Topics in Aerospace Engineering I)
üß ÜÙÜÖî : Ø ÷ Ùûî ßï × Üıß Ùü
Prerequisite : Department Permission
Ö ł ï ł ł , ÷ ÿ ö ÷ î œ ð Ù ł à Ø ÷ Œ î ł Ö ł ý þ î ÿ ß × ý ü Ö ł ö Ö ł œ e ü Ö ý
î ß ı Œ Ö Ý Ê Ö ü 06998
Lectures, seminar and individual investigations in selected areas of Aerosp
Engineering having the different context with 106998.

106998 ł Ü Ø Þó à î ý Ü Ø ł ö Ö ł œ e 2 Ö ý 3(3-0-6)
(Selected Topics in Aerospace Engineering II)
üß ÜÙÜÖî : Ø ÷ Ùûî ßï × Üıß Ùü
Prerequisite : Department Permission
Ö ł ï ł ł , ÷ ÿ ö ÷ î œ ð Ù ł à Ø ÷ Œ î ł Ö ł ý þ î ÿ ß × ý ü Ö ł ö Ö ł œ e ü Ö ý
î ß ı Œ Ö Ý Ê Ö ü 06997
Lectures, seminar and individual investigations in selected areas of Aerosp
Engineering having the different context with 106997

0100472056 Ö øÙüødß õýÉ× 3(3-0-6)
(Advanced Modal Analysis)
üß ÜïÙÖî : õ
Prerequisite : None
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ðøÖéÈ ø õúdýÙ ïøø ïîßâýÖ ø õúdïï úêËöø ýÉÙèÖú
ø ïîßâý
Modal analysis of linear systems, characteristic systems, solutions of no
systems by Volterra series, Hilbert transform, Kernel of nonlinear sy
applications of Hilbert transform to system, multidimensional Hilbert tran
identification of nonlinear systems.

0100472066 ø ïïÙöüïÙ öýéÿöì 3(3-0-6)
(Optimal Control System)
üß ÜïÙÖî : õ
Prerequisite : None
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Ùüöï Ùïï öýöîÙÃêÖéøèÖÙø ðøêÖøöïúüêÙýøÖêÖø
ïï öÿö
Optimization problems for dynamic systems, discrete-time optimum controllers, conti
time optimum controllers, tracking problems, dynamic programming, random process,
observers.

0100472076 ø ïïÙöüïÙÖâý 3(3-0-6)
(Nonlinear Control System)
üß ÜïÙÖî : õ
Prerequisite : None
Ùü ö ö ÷×ßÙýùïãëøõíúóõôôÙÖú õôÙöÖÙø Ö ïïü
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ðïøêü ÃêüýÉ ÖßâýÖ øÙÝÞÙø ÜêÖ
Lyapunor, stability theory, Lyapunov function, backstepping design, sliding
passivity, passivity-based control, adaptive control, introduction to intelligent c

0100472086 Ö øü ÙêîÿÖúî î 3(3-0-6)
(Nano-Positioning)
üß ÜïÙÖî : õ
Prerequisite : None
ø ïÖéÖ éøãüÙÙüö÷úÙüÖãéÙüî÷Ö øÙüàdýÙöøøëîêì Üó
ÙèÿêüýèÿêüaõøîdïøðîãÖ øßàÙãðìêÃüï×Ùú
ïï ÷óÃéÖúÙÜõ÷øïêî ÖêøÙîßÖî î
Coordinate system, positioning measurement, stiffness and precision, servo
dynamic performance, material properties, thermal, capacitance sensor, using
Piezo actuator, nanometer precision mechanism, function of nanomechan

010047209 [illegible] 3(3-0-6)
(Advanced Signal Processing)
[illegible] : [illegible]
Prerequisite : None

[illegible]

Signals in time and frequency domain, fourier transform, discrete fourier transform, fast fourier tran
practical uses of fast fourier transform, determination of power spectral density, determin
energy spectral density, applications of acoustic emission signal analysis, case studies on problem
analysis using mechanical signal from hard disk driver operation.

010047210 [illegible] 3(3-0-6)
(System Identification)
[illegible] : [illegible]
Prerequisite : None

[illegible]

Parametric and non-parametric method, model approximation, feedback t
analysis, frequency analysis, correlation analysis, the least square estimation, de
the model dimension, best linear unbiased estimation under linear constraints, updating the pa
estimates for linear regression models, best linear unbiased estimates for linear regression
optimal prediction, relationships between prediction error methods and other identification m
the recursive least squares method, identifiability considerations for direct identification
identification with joint input and output identification.

010047211 [illegible] 3(3-0-6)
(Process Modeling and Simulation)
[illegible] : [illegible]
Prerequisite : None

[illegible]
MATLAB/SCILAB.

Introduction to modeling, a systematic approach to model building, classification of m
conservation principles, thermodynamic principles of process systems, development of steady state a
dynamic lumped and distributed parameter models based on first principles, analysis of ill-cond
systems, development of grey box models, empirical model building, statistical model calibrat
validation, population balance models, solution strategies for lumped parameter models, stiff di
equations, solution methods for initial value and boundary value problems, Euler's method, R-
shooting method, finite difference methods, solving the problems using MATLA

010047212 ï ï Ùöü Ö ø ï ûýÙÖ ø × 3(3-0-6)
(Advanced Process Control)
üß ÜïÙÖî : õ
Prerequisite : None
ø ïîé îÜ ûéýÙñúê ïÿî ÜÝÖ øÝïðê ïÿîâÅÝêïÖé
ÿâ â ëýúâÿâ èøïÖüîõìÝÙöÜúø Ö ïÖáúÙüïñÙê ïÿî Ü
ßÙÜÖî áÜüdÿëøõñúê ïÿî Ü é öïâëöüïÖ øêdøø
ø ïüðïé ø ïïðÙüZigler-Nichols, Cohen-Coon ø ïé Nyquist
ïïÝú Ü øßø ïïÙöüÖè ýp îÜ(cascade, ratio, feed forward, adaptive
selective controls, computing relays, simple alarms, Smith predictor, internal model control)
Ùüöî Ùï úü÷ëø øëø ïðÙüï Ùü÷ëø ø Ö ïïø ïïÝüú Ù
Review of first and higher order systems, closed loop response, response t
impulse and sinusoidal disturbances, types of valves, linear, equal percentage and
opening valve, design of valves, transducers, block diagrams, stability analysis, fr
response, design of control systems, controllers, process identification, Zigler-
and Cohen-Coon tuning methods, Bode-Nyquist plots, process modeling, special c
techniques, advanced control techniques, cascade, ratio, feed forward, adaptive co
selective controls, computing relays, simple alarms, Smith predictor, internal model co
theoretical analysis of complex processes, interaction, control analysis of multiva
systems, examples of storage tank, review of matrix algebra, Bristol a
Niedenlinski index - tuning of controllers, design of digital controllers.

010047213 øÜéÙÞ ó aîîóÜýédüÿêÖø øÙüïÙ 3(3-0-6)
(Selected Topic in Dynamics and Control I)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øïøÿöø÷îú Öâ ÙæÙ÷êîøÖÙ Öøýî ß ×aÜéúýdüÿêÖø øïÙüïÙ
öî ßú êÖÝß:Ö 010047201, 010047202, 010047203, 010047204, 0100
010047207, 010047208, 010047209, 010047210, 010047211, 010047212
Lectures, seminar and individual investigation in selected areas of dynami
control having the different other than 010047201, 010047202, 01004720
010047205, 010047206, 010047207, 010047208, 010047209, 010047211, 0100472
010047213.

010047214 øÜéÙÞ ó aîîóÜýédüÿêÖø øÙüïÙ 3(3-0-6)
(Selected Topic in Dynamics and Control II)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øïøÿöø÷îú Öâ ÙæÙ÷êîøÖÙ Öøýî ß ×aÜéúýdüÿêÖø øïÙüïÙ
öî ßú êÖÝß:Ö 010047201, 010047202, 010047203, 010047204, 0100
010047207, 010047208, 010047209, 010047210, 010047211, 010047212
Lectures, seminar and individual investigation in selected areas of dynami
control having the different other than 010047201, 010047202, 01004720
010047205, 010047206, 010047207, 010047208, 010047210, 010047211, 0
and 010047213.

0100473001 Computational Fluid Dynamics and Heat Transfer 3(3-0-6)
(Computational Fluid Dynamics and Heat Transfer)
วิชาบังคับก่อน : ไม่มี
Prerequisite : None
หลักการของสมการเชิงอนุพันธ์ย่อย การจำแนกประเภทของสมการเชิงอนุพันธ์ย่อย เงื่อนไขเริ่มต้นและเงื่อนไขขอบเขต การหาผลเฉลยโดยวิธีผลต่างสืบเนื่องจำกัด ความสอดคล้อง เสถียรภาพ และการลู่เข้า วิธีการทำซ้ำสำหรับสมการผลต่างสืบเนื่องจำกัด การแก้สมการเชิงอนุพันธ์ย่อยแบบพาราโบลิกและไฮเพอร์โบลิก
Fundamentals of partial differential equations, classification of partial differential equations, initial and boundary conditions, derivation of finite-difference expressions, consistency, stability, convergence, iterative methods for finite-difference equations, solution of parabolic and hyperbolic differential equations.

0100473002 การออกแบบระบบความร้อน 3(3-0-6)
(Design of Thermal System)
วิชาบังคับก่อน : ไม่มี
Prerequisite : None
กระบวนการออกแบบทางวิศวกรรม การพิจารณาสำหรับการออกแบบทางวิศวกรรม การเลือกอุปกรณ์สำหรับระบบทำความร้อน แบบจำลองทางคณิตศาสตร์สำหรับอุปกรณ์ความร้อน การจำลองระบบ เทคนิคการหาค่าเหมาะที่สุด การวิเคราะห์ชั่วขณะของระบบความร้อน
Engineering design process, considerations for engineering design, equipment selection for heating systems, mathematical models for thermal equipment, system simulation, optimization techniques, transient analysis of thermal systems.

0100473003 ระบบกักเก็บพลังงาน 3(3-0-6)
(Energy Storage System)
วิชาบังคับก่อน : ไม่มี
Prerequisite : None
ความสำคัญและรูปแบบของการกักเก็บพลังงาน การกักเก็บความร้อนสัมผัส การกักเก็บความร้อนในวัสดุเปลี่ยนสถานะ (PCM) การกักเก็บพลังงานศักย์ การกักเก็บพลังงานจลน์และพลังงานไฟฟ้า การกักเก็บพลังงานเคมีและพลังงานความร้อนแฝง การกักเก็บพลังงานระยะยาว การทดสอบระบบกักเก็บพลังงาน การจำลองระบบกักเก็บพลังงาน ด้านเศรษฐศาสตร์ของระบบกักเก็บพลังงาน การกักเก็บพลังงานความร้อนจากแสงอาทิตย์และการประยุกต์ใช้
Importance and modes of energy storage, sensible heat storage, latent heat storage in phase change materials (PCM), potential energy storage, storage as potential and kinetic energy, electrical and magnetic energy storage, chemical energy storage, long term energy storage, testing of Energy Storage System, economic aspects of thermal energy storage, solar thermal energy storage and application.

0100473041 è óúýdïÜÎø 3(3-0-6)

(Advanced Thermodynamics)

üß ÜïÙÖÎ : õ

Prerequisite : None

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ôÿúøÙ÷ ÖÙÜßøßdéßÎÙøÖÜßøßdéßÎ×ÖÜõÚ

Review of first law and second law of thermodynamics, systems and control v
analysis, availability analysis, availability balances, equations of state, thermody
property relations, thermodynamic properties of homogeneous mixtures, chemical re
multiphase-multicomponent systems, chemical availability of fuels.

0100473051 Õ øÙüøïïÙÚÎøÖ ïïøïïÖÙøîêÿîÖÖøúéÙÖ 3(3-0-6)

(Energy system engineering and analysis)

üß ÜïÙÖÎ : õ

Prerequisite : None

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Energy system, design of process industries, concept of energy analysis
and system design, basic concepts of mass balances for the energy sy
analysis of thermodynamic processes, basics of system engineering, analys
measurement methods, design of typical system, basics of some impo
equipments and instruments used, such as piping systems, pumps, an
exchangers, case studies describing optimal systems.

0100473061 Ö øûîéïö 3(3-0-6)

(Inviscid Flow)

üß ÜïÙÖÎ : õ

Prerequisite : None

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ïïàîééÖ÷öøüõúýdÿêÜøÖøùÞ×ãÜÎÜÖøûîéïúêæ

Governing equations of motion, kinematics, vorticity, transport, general theo
irrotational flow, including two-dimensional flow, the complex potential, and t
dimensional potential flow, applications of the theory and free streamline th
Inviscid Flows with vorticity, vortex dynamics, unsteady wave theory, inviscid compressible

010047307 [illegible] 3(3-0-6)

(Theory of Turbulence)

[illegible]

Prerequisite : None

[illegible]

Concept of turbulence, transition theory of laminar flow stability, experime
observations on turbulence generation, turbulent kinetic energy distribution, stati
description of turbulence, mean turbulent energy and reynolds stress closure models, tu
shear flows in free turbulence and wall turbulence.

010047308 [illegible] 3(3-0-6)

(Convective Heat and Mass Transfer)

[illegible]

Prerequisite : None

[illegible]

Heat and momentum transfer in laminar and turbulent flow. the laminar boundary
solution. similarity and nondimensional mass-momentum heat transfer a
convective heat transfer at high velocity, instability transition and turbulence. free conve

010047309 [illegible] 3(3-0-6)

(Conduction Heat Transfer)

[illegible]

Prerequisite : None

[illegible]

Fundamentals of heat conduction in isotropic and anisotropic solids, methods of solu
steady and transient heat conduction problems in one, two and three dimensions, interna
sources, periodic flow of heat, problems involving selected interesting Topic with approx
to analytical and numerical techniques.

010047310 [illegible] 3(3-0-6)

(Radiative Heat Transfer)

[illegible]

Prerequisite : None

[illegible]

Fundamentals of thermal radiation in participating media, surface properties and view
design of furnaces and radiant boilers, optical temperature diagnostics and remote sensing

0100473101 Optical Technique in Heat and Fluid Flow Measurements and Data Proce 3(3-0-6)
(Optical Technique in Heat and Fluid Flow Measurements and Data Proce
Prerequisite : None
Light Propagation Basic and General Notation, Scattering by a Perfectly Spherical P
Propagation of Light Inside a Particle, Scattering by Particles, Temporal Effect
Pulsed Laser, Current Measurement and Techniques for Measuring Particle Pr
Data Processing for Optical Measurements.

0100473102 Steam Boiler and Furnace System 3(3-0-6)
(Steam Boiler and Furnace System)
Prerequisite : None
Steam generation and steam boiler design, mechanism in boiler furnac
performance analysis, estimation of emission from boilers, heat transf
convective heating surfaces, processes on the fireside of heating surfa
calculation of steam boiler.

0100473103 Viscous Flow 3(3-0-6)
(Viscous Flow)
Prerequisite : None
Exact solutions of Navier-Stokes equations, boundary-layer theory. Re
stresses and turbulence, internal, and boundary layer flows. applications to hea
mass transfer and to chemical reacting flows.

0100473104 Selected Topic in Thermal and Fluid I 3(3-0-6)
(Selected Topic in Thermal and Fluid I)
Prerequisite : None
Lectures, seminar and individual investigations in selected areas of mech
engineering having the different other context.

0100473152 øÜéÙÞ ó aîïÖÜø é ï ü î Öâî øúÙ×ü 2Üø ú 3(3-0-6)
(Selected Topic in Thermal and Fluid II)
üß ÜïÙÖî : õ
Prerequisite : None
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ê Ö Ú ê Ý ß Ö ü
Lectures, seminar and individual investigations in selected areas of mech
engineering having the different other context.

0100474012 Ö Ö ø ú Ö Ö ø ø ð ã ÷ ö 3(3-0-6)
(Principles and Application of Combustion)
üß ÜïÙÖî : õ
Prerequisite : None
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ì ù þ ã ú ü ô ú ö ê ü ø ÷ Ý ÿ ê Ö Ü ø ñ a î ê Ü ñ ÿ ø ö Ù Ø ÷ ö ê õ ü
ü ß ì ù þ ã Ü ñ ú Ý Ö Ö ø ì é ú Ü
Energy and energy analysis of thermal system, combustion of all type of combusto
incinerators, flame and mixed-flame theory, explosion, furnace combustion cha
combustors for reciprocating engines, theoretical and empirical approaches.

0100474022 ß ó Ü ú ú Ö ø ñ ö 3(3-0-6)
(Fuel and Combustion)
üß ÜïÙÖî : õ
Prerequisite : None
ú Ö Ö ø ú Ö ø ä Ü ü î Ö ð ø ñ õ ì é ó Ü Ù ÿ ß ï ú Ö ú þ è ê x ö Ü ó ß ú
Ö à ß ó Ü ú ú ü ó Ü ú Ü ß Ö þ è ê x ö Ü ð ú ü ô Ý a ï Ö Ê Ö Ö ø ø ñ a ÿ ê ö ë Ù
ö ø è ó ú ý ë ÿ ë Ø ø ÿ ú Ê ø Ý ú ñ î × Ù Ö ø ÿ ö é ó Ü ú Ù ø î ú í õ ø × ÿ Ü â ñ
õ ó ø ü ö × Ö Ü ø Ù a ñ Ì ó Ü ú ë Ü × ß ó Ü ú ú ü ó Ü ú Ö ß
Basic concepts of combustion phase, classification of fuels, properties
characterization of gaseous, liquids, and solid fuels, characteristics of the combustion
stoichiometry, thermodynamics of chemical reaction, kinetics of combustion, e
balance and furnace efficiency, overview of combustion technologies for solid, liqu
gaseous fuels.

0100474032 Ö ø ï ü î Ö ø ÿ ú ð Ö ø ø ñ ö 3(3-0-6)
(Spray Process and Combustion)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ø ï ü î Ö ø ÿ ú ì ð ø Ü × ó Ü ú Ö ü ø é × é × ð ÿ ø ö ê ø ÷ Ü Ö ø ÿ
ú ÿ ð ø ø ÷ a Ü ÿ ø Ö ø ø ÷ a Ü ð ß ú Ö ü ø ø ß ÷ ó ú Ü Ö ü ø ø ÷
Ö ø a Ü ð ß ú ú ü ï ÷ Ü ÷ é ø é ñ ï ë ö ü ï Ö ú ú ï ï ÿ Ð ø ø ÷ a Ü ø ö
ú ` ï ß ó Ü ú ú ü
Spray processes, atomization of fuel, drop formation in spray, interaction of air
sprays, spray combustion, burning of liquid fuel, vaporization of liquid, isolated droplet vapor
and burning, droplet array burning, gaseous combustion, liquid film and pool burning

010047404 Biyokütleden Enerji 3(3-0-6)
(Energy From Biomass)
Ön Koşul : Yok
Prerequisite : None
Biyo-enerji üretiminin avantajları, biyokütle için ısıl dönüşüm teknolojileri, biyokütle taşıma ve işleme, biyokütle briketleme, biyoyakıt üretimi, biyogaz üretimi, ısıl ve termokimyasal dönüşüm prosesleri, piroliz, gazlaştırma ve yakma, çevresel etkileri, biyokütle kullanımı için politika ve çerçeve.
Advantages of bio-energy production, conversion technologies for heat and biomass handling and processing, biomass briquette preparation, biofu biogas production, thermal and thermochemical processes, pyrolysis, gasi and combustion, environmental impacts, framework for biomass utilization

010047405 Sprey ve Atomizasyon 3(3-0-6)
(Atomization and Sprays)
Ön Koşul : Yok
Prerequisite : None
Atomizasyon olayları ve temel prensipleri, parçalanmalar, sprey karakteristikleri, sprey boy dağılımları, atomizör tipleri, basınçlı enjektör, girdap etkili atomizörler, atomizörlerde akış, atomizör performansı, sprey karakteristikleri, damla boyutu ölçme teknikleri, damla buharlaşması.
Atomization phenomena and basic principles, breakups, representativ size distributions of sprays, atomizer types, pressure injector, pressure swirl at flow in atomizers, atomizer performance, spray characteristics, drop size meas techniques, drop evaporation.

010047406 Isı ve Güç Üretimi için Biyokütle 3(3-0-6)
(Biomass for Heat and Power)
Ön Koşul : Yok
Prerequisite : None
Biyokütle karakteristikleri ve ısı ve güç üretiminde kullanılabilirliği, yanma analizi, kazanlar, buhar üretimi, yanma, güç üretim ekipmanları, kojenerasyon prosesleri, performans analizi, biyokütle projelerinin finansal değerlendirmesi, emisyon hesaplamaları ve kontrol yöntemleri.
Biomass characteristics and availability for utilization in heat and po production, combustion analysis, boilers, steam generating equipmen processes, cogeneration, performance analysis, financial evaluation of b projects, emission calculations and control methods.

010047407 Yanma I'de Seçilmiş Konular 3(3-0-6)
(Selected Topic in Combustion I)
Ön Koşul : Yok
Prerequisite : None
Bu derslerde 010047401, 010047402, 010047403, 010047404, 010047405, 010047406, 010047408 ve bu derslerden farklı olarak mühendislik alanlarının seçilmiş konularında araştırma ve incelemeler.
Lectures, seminar and individual investigations in selected areas of mech engineering having the different content than 010047401, 010047402, 01 010047404, 010047405, 010047406 and 010047408.

010047408 øÜéÙÞ ó aîÖÜæa ñ ö 3
(Selected Topic in Combustion II)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øïøÿöøë÷îú Öàùæéù÷êîø Öøÿ îß ýxüÖøëöÖùîøß
êÖùêÝß 010047401, 010047402, 010047403, 010047404, 010047405, 010047406 ú 010047407
Lectures, seminar and individual investigations in selected areas of mech engineering having the different context other than 010047401, 010047402, 0100 010047404, 010047405, 010047406 and 010047407.

010047501 åýüÖøøëð÷îø÷îê 3(3-0-6)
(Fundamental of Automotive Engineering)
üß ÜïÙÖî : õ
Prerequisite : None
Öúù úÜóÜúêaÙÖ øß î÷øéÜîýÖîøÖùúêøÙÖ úéîÝøïïï×
Ùûîë÷üaÝöøøïêÜ ðaìíõ óú ñûÖØüøàéêø ÷aî úéÝ
îéúðÙøÖÜïêîüøßÙßÙaÜ÷éðô ÷øúîß ÿïøøÙøëîÖúø×
× ÜÙ÷ðêêÝÖïøÙ÷úú

Power and energy requirements, traction resistance, selection and rating drive systems concerning operating performance, efficiency and environmental im functional description and rating of various components such as clutch, ge differential and brake, driving performance of motor vehicles, driving limits.

010047502 Ú úýüÿüÖøøëð÷îø÷îê 3(3-0-6)
(Mechanics of Automotive Engineering)
üß ÜïÙÖî : õ
Prerequisite : None
ø ïïøë÷Üÿøëaúîüîø Ùøëð÷îøÜïÙ÷úÜîø×Ùüÿ÷ëøõó×ðÜ÷ î
ïïÝúÜ÷ëðî÷Ùîêýa
Suspension system, tire, spring, car seats, steering system, stability con vehicle, four wheel vehicle model.

010047503 ø ïýüÖøøëð÷îø÷îê 3(3-0-6)
(Automotive Engineering System)
üß ÜïÙÖî : õ
Prerequisite : None
îúéÙåî÷üÖÖ ø Öøëïêø Öøëïèø Ö ï îøçîúÙÖ÷ëøÙ
øëð÷îÜêÜÿøëø ø Öø÷ïÖéøëð÷ýÜêîêüï×Ö çøîóÙaúÜÿøüïÖ ø
Ùîüè ðúëêðêø ìéÿaÜïëøø ø× ëaÜaÙaÜÿø
Conception of the vehicle bodywork, design systems and development of co motor vehicles, ergonomic design aspects, development of lightweight constru methods of computation using finite element, laboratory testing of complex structu

0100475040øÜéÙÞ ó aîíýÜÖê ø ø ðÌ ÷ î ÷ î ê 3(3-0-6)
(Selected Topic in Automotive Engineering I)
üß ÜïÙÖÎ : õ
Prerequisite : None
Ö ø ï ø ýÖö÷ö î÷ú ÖâÙàáèÙ ÷ ê î ø ÖÜ Öðý aîíýéü Ö ø ø ùö÷ î î÷ßî ê
ê ÖÜê Ýß 0100475010, 0100475020, 0100475030
Lectures, seminar and individual investigations in selected areas of autom
engineering having the different context other than 010047501, 0100475

0100475050øÜéÙÞ ó aîíýÜÖê ø ø ðÌ ÷ î ÷ î ê 3(3-0-6)
(Selected Topic in Automotive Engineering II)
üß ÜïÙÖÎ : é ÷ Ù ñüß öï × Üß õ Ù ü
Prerequisite : Department Permission
Ö ø ï ø ýÖö÷ö î÷ú ÖâÙàáèÙ ÷ ê î ø ÖÜ Öðý aîíýéü Ö ø ø ùö÷ î î÷ßî ê
ê ÖÜê Ýß 0100475010, 0100475020, 0100475030
Lectures, seminar and individual investigations in selected areas of autom
engineering having the different context other than 010047501, 0100475

0100476020úý dýüê Ö øÙ üÜÙ Ö ý ÷ î 3(3-0-6)
(Aerospace Dynamics and Control)
üß ÜïÙÖÎ : õ
Prerequisite : None
ÙÙ ø ê Ö ýö÷ ê Ö ø Ö ì × ØÜÙ úÖÖ ý ø ÷ î Ù îú î ü Ê üø î Ù îú î ü × ü Ü
ì ù þÖã ø Ù Ö Ü ï ø ù ýø ê õ Ö óø Ö îï ê Ö Ê ö ø ï
Aircraft instrument, aircraft equations of motion, longitudinal motion, lateral motion, c
theories, stability augmentation, autopilot design.

0100476030Ø ø Ö ï ï Ö ý ÷ ýê ï ï ö ÿ ö ì 3(3-0-6)
(Optimal Aircraft Design)
üß ÜïÙÖÎ : õ
Prerequisite : None
Ö ø Ö ï Ù óö Ö ý ö ø ý é Ü ð ý ö Ö ê ý Ù ê ø ì Ù ÿ ð × Ü ð
ì õ Ü î ⊗ ø ì Ù ÿ ð × ì Ö ð Ü â ÿ ú ö î ⊗ ø ö ø Ê ø Ö ï ï ó
Ù î ö ÿ ö î Ö ø Ü ï Ö â × ä Ö Ù ø ú î Ù Ö ø Ö ã Ö ÷ ï ï ú ä ï Ù ï Ù
î Ö ø ÿ Ö ø ï ø ë î Î Ö ø õ é ï × î ê ø ð ï × Ü ï Ù ø ø ð ø õ Ö è ø
Ö ï ê ø Ö Ý é Ö Ü ø Ö ú Ù ø ð ê å â ú Ö Ö ý ñ ú Ö ø ì ø ï ê Ü î Ö ø
Ö ï ï Ü Ù ø
Optimum design concept, problem formulation, unconstrained optimization, non
constrained optimization, aircraft design process, conceptual design, require
airworthiness regulations, aircraft performance, overall configuration and
systems, parametric analysis, aerodynamic design, wing and tail design, pow
selection, landing gear layout, trade study.

010047605 5ùþãÜ Ö ýdú ý ÿêø 3(3-0-6)
(Theory of Aerodynamics)
üß ÜïÙÖî : õ
Prerequisite : None
ÿöÖ ø Ö ø úõ×ìÙÖ×øêÜóúúÜ îøø úîéïúòéêïî óî Ö ý ú
ðõÖ ÙÜîøÖ ø ú ïï÷úùþñ ßøÙèÞõãñ øÖ÷øÖ éêêÖï é Ö
ÙîúßÙ ú îÙÖ óøûîßñáú àûêõV àÖøáúÝÜÖ øÜâúÝÖ ïø ßú ïïö
Ùüéúîßñ ïïø÷ï éñþî
Flow governing equations (integral and differential forms), inviscid, incompressible flo
airfoils and wings, potential flow theory, lifting-line and lifting-surface theory, compressib
shock and expansion waves, flow through nozzles and diffusers, linearized flow, Viscous
laminar and turbulent boundary layers.

010047606 øýÖê 3(3-0-6)
(Aeroelasticity)
üß ÜïÙÖî : õ
Prerequisite : None
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Ö øÙüøÖ øÖ×øÖêêúÖðöîõ üÖÜúïÖúøêüøÜ úøÖÜêø
Ýú Ü× Üdúúøýêàúø Ö öøÙüïÙ

Static and dynamic aeroelastic phenomena, aerodynamic loading, unsteady aerodynamics,
analysis of fixed wings and rotary wings under various flow conditions, analytical meth
aeroelasticity, aeroservoelastic modeling , and active control.

010047607 Ö éøúÝÜ ú Ö ø aÜÖÖúïÜÙÜøÙÜøÿø 3(3-0-6)
(Aircraft Structural Layout and Design)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ãø÷ïúïaïÜïÙî Ö ø Ö aÜÙ ÜïøÙúýøÿêÜøèÙøÜÜÿøøïÜ×ÜÖøøÜ
ìÖø îÖîøïïÿöö êÿøöúÖêøÜÜîñúÙöïÜÙîì ú ïïêÜ÷Öðú øÜì
Ö ø Ýï Öøúïð Ý ÖîÜÖõøÙÜÖúø Ö ø×ÝÜ÷êÜì Ü dÖÖøúýÜ×óéúÜÿ øøêø
Ö ø Ý ÷×î Ùú øöêêÖÖêø ÿ÷× ÜaÜÖÙøøÙÜÿÜø úéÖî ÜêêïÜ aÙøÜÿø
Airworthiness regulations, rigid aircraft symmetric and asymmetric fligh
unchecked and checked control movements, gust and maneuver load, aerody
load distribution, balance loading, shear, torsion moment, failure modes, st
layout and initial sizing.

010047608 Ø øÙüødú Ö ø Ö ïïø ïï üÖ ý 3(3-0-6)
(Space System Analysis and Design)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øÙüødú ÖîñïÖóüÖÜýüaéúî üÖÖøý Ö ïÖüÞøÙ ÙÖÝøïú
Ö îé×î é÷øî ïüïÊ×ýÜ÷ ÿïëêêÖÖýøøöÿ× ÖøÙø øÖÜ ïïîéú Ö
×î é× Üøîêïøõïüýøî ÖÖýøÙüøÙüà`öñêéÖ øÙüøêaîî
Space mission analysis and design, spacecraft design, spacecraft desi
sizing, spacecraft subsystems, communication, ground system design and
launch systems, reliability analysis, cost analysis.

010047609 ïøæ×Ü Ý ø ü é 3(3-0-6)
(Rocket Propulsion)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ú ý ðÿ ê øú ø ï ê× Ü Ý Üø Öî ê ø ì ÷ î ú Ö Üú é ú ðÙ Öû å ø ô × Ü ê Ö ø ×
é ÷ aßß ó Ú ú Ü× ú ó ðÙ Ú ý ø ü ê ì Ù ú ô Ù ú ô \ ô î Öï ê ø ×
Flight mechanics and propulsion system interplanetary flight, basic princi
solid and liquid chemical Rocket Propulsion, nuclear-electric power and
Rocket Propulsion.

010047611 ú ý ðÿ ú ê Ö ø è ü î ï Ù Ö ý 3(3-0-6)
(Spacecraft Dynamics and Control)
üß ÜïÙÖî : õ
Prerequisite : None
ó ú ý ðÿ ê ø Ú ý ø Öÿ ê ø ü × Ü ê ÷ î à ï Ö ê ÿ ø ø ì ø Ù Ö ê Ù ü ø Ö ø ì ø Ü ê
ì ù þ Öà ø ÙÖ ï ø Ö ï ïÖ Ö ø ø ì ø Ü ê
Orbital dynamics, spacecraft attitude dynamics, attitude sensors, attitude control actu
control theories, attitude control design.

010047612 ø Ö ï ï ú Ù ø Ù ê ï Ö ú ÷ î 3(3-0-6)
(Aircraft Engine Design and Technology)
üß ÜïÙÖî : õ
Prerequisite : None
ì ï ì ü î ð ö ø é Ö ðÿ ú ö Ö ø é ê Ö ï à å î ÿ ö ø ø î × à Ö Ö î é ø î Ö ø Ö
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Ö Ü î ì ð ø à Ü ñ a ú Ö ø à ì ñ ì Ü ø Ö Ö æ ê ë Ù ø ð î ê Ù Ö ú æ ÷ ß ý î
Ù ø ÷ ð Ö ê ø ì é ÿ ï ì ö ú ï ø Ö Ù ø à ð î ê
Review of thermodynamics and compressible flow, fundamental of a
engine design requirements, gas turbine cycle analysis, thrust and perform
parameters, off-design analysis, engine matching, inlet and nozzle, comp
performance, turbine performance, combustion and afterburner, engine insta
component manufacturing and technology, engine testing and maintenan

010047613 ø Ü é Ù Þ ó a î ý Ü Ö ø ê ö ú Ö ü ø Ö ý 3(3-0-6)
(Selected Topic in Aerospace Engineering I)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ø ï ø ø ÿ ö ÷ ö ÷ ú Ö à Ù à ø ð Ù ÷ ê î ø Ö Ù Ö ø ý a î ý é ü Ö ø ê ö ú Ö ü ø ð Ö ý ì
î ß ü ê Ö é ð 010055601, 010047602, 010055603, 010047604, 0100
010047607, 010047608, 010047609, 010055610, 010047611, 010047612
Lectures, seminar and individual investigations in selected areas of aero
engineering having the different other than 010055601, 010047602, 0
010047604, 010047605, 010047606, 010047607, 010047609, 010055610, 01
010047612 and 010047614.

010047614 øÜéÙÞ ó aîíýüÜëø øôúÖ üØÖ ý 3(3-0-6)
(Selected Topic in Aerospace Engineering II)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øïøýö÷öî÷ú Öâ ÙàáèÙ÷êîøÜÖýaîíýéüÖøôúÖüØÖý
îßêÜéÖ 010055601, 010047602, 010055603, 010047604, 01004
010047607, 010047608, 010047609, 010055610, 010047611, 010047612
Lectures, seminar and individual investigations in selected areas of aero
engineering having the different other than 010055601, 010047602, 0
010047604, 010047605, 010047606, 010047607, 010047609, 010055610, 01
010047612 and 010047613.

010047700 Ø øâüôïï ú Ü øÝ øîØúôÖüôø× 3(3-0-6)
(Modeling and Simulation of Polymer Processing)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ýîóïïúÝ ÜÖÖøøðúüéïøÝ ÜÖ ìáÙîÖúîüÙéø÷ïíüôéêôê
ôáúîàîéúöîéú ïïïéúáøúöîÝéú ÜÖ øàôúüïïéïïÖéú
ïïéøÝú ÜÙÖ øîÙàîúöøÖ÷ àôøø `ÜÖø ïüîðÖøúÝÙÜÖøø
ú×ÿéêüî÷ïïéÖø ú×üÉéøÖÜøÙüöõýø `ÜÙàúöÙ
Ùüëéÿîéúöúáúøóöõîýö
Flow model development, flow modeling, finite difference technique, f
element method, boundary element method, injection and compression mold fi
simulation, extrusion, heat transfer and curing, viscoelastic fluid flow simulatio
flow, stress-strain analysis of polymeric and composite parts.

010047702 øýé÷ÜéúöøÜ 3(3-0-6)
(Polymer Rheology)
üß ÜïÙÖî : õ
Prerequisite : None
Ùèÿëïï ÜÖ Ù÷ñàõÙèÿëïï ÜÖúóÖùêøëøÖ×ÿÜéüúöîøÖ øî úñ
øðìøÜ ú `ÜÙ ñéîàêðÖëø÷öÖøöîåîßÿöÖøöîúöõîê
óÜÜÖîøùúøÖ øýé×úöîîøìøÜõÜßýïöêÜØÖøïèéàî÷ïïÝ
ñßÿöÖøúÿ÷ÖÖøæ×úÜïùöúøø ú× Üé×é Ù÷ïïúñàÿõ `ÖîàÿÜ
Description of the physical, thermal, and rheological behaviors of poly
materials relevant to various flow geometries, transport phenomena equations o
momentum, and energy, analysis of fluid flows in various geometries, elem
constitutive equations: power-law model, Bird-Carreau model, linear and non-linear visco
fluid flows.

010047703 Ö ú ý ø ä ÿ ê Ù ø ó ö d ù ï Ù ø 3(3-0-6)
(Mechanics of Solid Polymers)
ü ß Ü ï Ù Ö Î : õ
Prerequisite : None
ó î å î ÷ ü Ö Ö ú ý Ù ÿ ü ê ø ï ê Ù ó ù Ö ê ø ø ö ø ú Ù Ù þ ã é ö ï ÷ Ö ø Ù ü ê ï ï ú Ù è Ù Þ è × Ö Ù ø ø ù ü ê è é ü î ÷ Ö Î é ø î ÷ ï ï ÷ Ù Ù Ù î Ö Ù ø ø d ú ð ø ö è ñ ú Ù ü ë é Ô ø ø ß ï í ú ô d ê ù ø ê ÿ è d Ù ü é é î ÷ ú ÿ ü ê Ù á ÷ Ü
Background of Continuum Mechanics, elastic behavior and theory, modeling characterization of viscoelastic behavior, elastic stability, analytical and approx solution techniques for engineering stress analysis, finite element analysis of viscoelast rubber-like materials.

010047704 ø Ü é Ù Þ ó a î ý Ü Ö ø ö d ø ú 3(3-0-6)
(Selected Topic in Polymer Engineering I)
ü ß Ü ï Ù Ö Î : õ
Prerequisite : None
Ö ø ï ø ÿ ö ÷ ö î ÷ ú Ö a Ù a d ê Ù ÷ ê î ø Ö Ù Ö ý î ß × ý ü Ù Ö ø ö d ø ú
î ß ê Ö ý ß 010047701, 010047702, 010047703 010047705
Lectures, seminar and individual investigations in selected areas of polymer the different context other than 010047701, 010047702, 010047703 and

010047705 ø Ü é Ù Þ ó a î ý Ü Ö ø ö d ø ú 3(3-0-6)
(Selected Topic in Polymer Engineering II)
ü ß Ü ï Ù Ö Î : õ
Prerequisite : None
Ö ø ï ø ÿ ö ÷ ö î ÷ ú Ö a Ù a d ê Ù ÷ ê î ø Ö Ù Ö ý î ß × ý ü Ù Ö ø ö d ø ú
î ß ê Ö ý ß 010047701, 010047702, 010047703 010047704
Lectures, seminar and individual investigations in selected areas of polymer the different context other than 010047701, 010047702, 010047703 and

010047801 î ÷ î d ê ÷ î ï Ü ÿ ê 3(3-0-6)
(Bio - Robotics)
ü ß Ü ï Ù Ö Î : õ
Prerequisite : None
î î ÷ Ö ü Ö ÷ î ÿ ø Ü ÷ ú ï Ü ÿ ê Ö ø î Ù ú Ü ÷ î d ê ï ê Ü ø ì ó ú ö Ý Ö Ö ø î Ù ú Ü Ù ê d ú Ö ÿ Ö ø × î Ö ú Ö ý ø ÿ ê ø ê Ü Ö ý ø ÿ ê Ù ø ø ï ê ú ÷ ß ö è ê Ö ø Ù Ö ï Ù ø î Ù ú Ü ø ï ê ú ß ê Ö Ý ø ÿ ø Ü Ö ø Ù Ö ï Ù ø ü ø Ü é Ö ø Ö ï ï ì î ÷ Ö Ö ê × ú × Ü
Introduction to biologically-inspired robots, various types of robot movement derive human and animal motion, principle of legged locomotion, rigid body dynamics, dynam multi-link systems, control of multi-joint motion, gait generation, control of bal mechanical design of legged robots.

010047802 2 ú ý dý-êîøêÜ 3(3-0-6)
(Advanced Robot Dynamics)
üß ÜïÙÖî : õ
Prerequisite : None
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ÿöÖ øúéÖÙøÖîøÜüý
Review of kinematics of robot manipulators, calculus of variation, a
lagrange equation in robotms, lagrange quasi-equation of motion.

010047803 3 øÖüîøÜÙ 3(3-0-6)
(Advanced Control)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øÜüïÝéúÖ øÖþøéüïÙöúÜùþãÝëøõÿéëøõ óïðîô
Ö øÜüïÜéøàÖéøÜüïïÙÙ÷øàÜø×Öý øÜüïîÙà
Digital control, Advanced Control Systems, stability, Lyapunov stability,
adaptive control, neural network control, fuzzy logic control.

010047804 øÜéÙÞ óaîýÜÖîø÷øðé 3(3-0-6)
(Selected Topic in Robotics I)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øïøøýëö÷úÖàÙøðÙ÷êîøÖÜÖøýîßø×ýÜúÖîø÷øðéëö
îßúêÖéÖ 010047801, 010047802, 010047803
Lectures, seminar and individual investigations selected areas of robotic
the different context other than 010047801, 010047802, 010047803 and

010047805 øÜéÙÞ óaîýÜÖîø÷øðé 3(3-0-6)
(Selected Topic in Robotics II)
üß ÜïÙÖî : õ
Prerequisite : None
Ö ø,øýëö÷úÖàÙøðÙ÷êîøÖÜÖøýîßø×ýÜúÖîø÷øðéëö
îßúêÖéÖ 010047801, 010047802, 010047803, 010047804
Lectures, seminar and individual investigations selected areas of robotic
the different context other than 010047801, 010047802, 010047803 and

010055600 Ö îøúÖ ýðúÜýýÖêý÷ î 3(3-0-6)
(Aircraft Flight and Aerodynamics)
üß ÜïÙÖî : õ
Prerequisite : None
Ö øÙÜøýöøøëîÜïÜïðÙ×éøøîêÜÜÙýøÖ øÖì×øïÙ×úÖîøï
êøÖêøøéÖîøøøìÜúúîÖøîÙøú×úÜÖÝîøéìÜÖïøëÜÖø
üÙøýöøøëîÜïÜïðÙîøÖýóúýéýëöÖøÖì×øÜÙÜøïðîö
øðïïÖî×øïï×ÖîøÖïïúüîÖîøîúÜÜüéÖîìïÜÖïøëÜ
The fixed-wing performance, airplane equations of motion, flight envelope,
climb, gliding flight, range and endurance, take-off and landing, maneuvering flight, the rot
performance, rotor aerodynamics, equations of motion, blade profile, flight envelope,
performance, vertical flight, forward flight and maneuvering flight.

010055603 Ö øÙüødÙ øaÜ ÿøÖ ý÷ î 3(3-0-6)
(Aircraft Structural Analysis)
üß ÜïÙÖî : õ
Prerequisite : None
Ö éøúÝ Ü ú Ö ø aÜÖÖúïÜ ÜÙïøàÖÖÿîé îÖ ø ÖaÜïïØÙøÖÜÿø
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Ö øÙüødÙ øaÜÜÿïøÿö ú÷ø ôdîêëÜêÜê
Aircraft structure layout, design requirements, loading, flight envelope, a
material, energy method, bending stresses, shear flow, single and multi-cell stru
analyses, wing spar and box beam, tubular wing frame, plates and shells, b
strength, shear panel, clip support, joint and fitting analysis, introduction to
finite element analysis.

010055610 ôúý dÿúêØ øÙaëÖÙîøúï üÖ ý 3(3-0-6)
(Dynamics and Control in Aerospace)
üß ÜïÙÖî : õ
Prerequisite : None
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Coordinate systems, coordinate transformations, Euler angles, Euler rates, qua
Lagrange's equations, flight dynamics, spacecraft dynamics, state space equations, stabili
feedback controllers, state observers.

010055902 ÷ îóîd 12
(Thesis)
üß ÜïÙÖî : 010035901 Seminar
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Students are required to submit a research proposal nominate a thesis advisor, the
thesis is subjected for approval by the committee and is presented both in the
approved written format and orally. Students are to present their researc
public seminar at least once before the defense. The first 3 credits mu
registered together with 010035902.