MOHAWK VALLEY COMMUNITY COLLEGE

UTICA AND ROME, NEW YORK

COURSE OUTLINE

Introduction to Unmanned Aerial Systems

UA101

REVIEWED AND FOUND ACCEPTABLE 4/20/2017

CATALOG DESCRIPTION:

UA 101 Introduction to Unmanned Aerial Systems C-3, Cr-3

This course presents the history of Unmanned Aircraft Systems and their current and future use in civil industry. Topics include history of development, aircraft types, ground communications, and launch and recovery systems while emphasizing human integration into the overall system

Student learning outcomes:

Upon completion of this course, the student will be able to:

1. Develop an understanding for the need for UAS
2. Embrace the history and use of UAS throughout the past 150 years
3. Discover the theories and applications of aerodynamics involved in UAS.
4. Understand the FAA regulations currently imposed for commercial and hobbyist use of UAS
5. Analyze a number of UAS as used by the United States military

DETAILED COURSE OUTLINE:

# 1. Introduction

(3 period)

1. Early History
2. Resurgence
3. The Vietnam War
4. Desert Storm
5. Mission Planning
6. Payloads
7. Ground Control Stations

# 2. Classes & Missions (3 period)

1. Very Small
2. Small UAV’s
3. Medium UAV’s
4. Large UAV’s
5. Expendable UAV’s
6. The Tier System

# 3. The AIR Vehicle (3 period)

1. Basic Aerodynamics
2. The Real Wing
3. Lift, Weight, Drag, Thrust
4. Flapping Wings
5. The Boundary Layer

# 4. Performance (3 period)

1. Overview
2. Climbing Flight
3. Range
4. Endurance
5. Gliding Flight
6. Emergency Procedures

# 5. Stability & Control (3 period)

1. Stability
2. Longitudinal stability
3. Dynamic Stability
4. Lateral Stability

# 6. Propulsion (3 period)

1. Overview
2. Loads
3. Sources of Power
4. Thrust Generation

# 7. Loads and Structures (3 period)

1. Overview
2. Loads
3. Dynamic Loads
4. Core Materials
5. Resin Materials
6. Skins
7. Sandwich Construction

TEST (1 Period)

# 8. Mission Planning & Control (3 period)

1. Overview
2. MPCS Architecture
3. Local Area Networks
4. Bridges and Gateways
5. Levels Of communications

# 9. Air Vehicle and Payload Control (3 period)

1. Overview
2. Modes of Control
3. Remote Piloting
4. Complete Automation
5. Controlling Payloads

# 10. Reconnaissance/ Surveillance Payloads

(3 period)

1. Overview
2. Imaging Sensors
3. The Search Process
4. Target Detection
5. Stabilization of the Line of Sight

# 11. Weapons Payloads

(3 period)

1. Overview
2. History
3. Mission Requirements
4. Payload Capacity
5. Electrical Interfaces
6. Structural Issues
7. Electromagnetic Interference

# 12. Other Payloads

(3 period)

1. Radar
2. Electronic Warfare
3. Nuclear Radiation
4. Meteorological devices
5. Pseudo Satellites

# 13 Data Links

(3periods)

1. Data Link Functions
2. ANTI –ARM
3. ANTI-JAM
4. Security
5. Low Probability of Intercept
6. Resistance to Unintentional Interference

# 14 Data Link Margin

(4 periods)

1. Transmitter Power
2. Antenna Gain
3. Processing Gain
4. Uplinks