

Rocket science
Electrical engineer's point of view
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1. History of Rocket Science

- Ancient History to 1920
- Early Developments - 1920 to 1940
- WWII
- Cold War
- Spaces Travel
- Types of missiles and missions
 - air-to air
 - surface-to -air
 - intermediate range ballistic
 - intercontinental ballistic
 - drones
 - cruise
 - UAVs
 - sounding
 - satellite and orbital
 - manned, orbital, and interplanetary

2. General Architecture and Construction of Rocket

- Propulsion
- Guidance
- Payload
- Design criteria and tradeoffs

3. Understanding the Mission and Its Implications

- Physics of motion
- Orbital mechanics
- Environmental conditions
- Mission planning
 - Types of missions
 - Primary focus, considerations, and concerns
 - Organizations involved e. g. government versus industry, scientific versus military

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4. Project Management

- Typical Organization
- Quality Assurance
- Science and Scientist
- Instrument Definition
- Development Phases
- Planning, Schedule, and Budget
- Organization and Diplomacy
- Systems Engineering
- Architecture
- Review and testing
- Delivery
- Launch
- Logistics and Support
- Wrap up and Project Completion

5. Control and Algorithms

6. Design, Development, Analyses, and Tradeoffs

7. Mechanics and Materials

- Subsystems Design
 - Instruments
 - Payload Structure and Connection
 - Power
 - Communications
 - Cabling
 - Cooling and heating
 - Shielding
- Ground Support Equipment (GSE)
- Environmental Concerns
- Reliability and Robustness
- Design and Development Rigor
- Testing
- Fabrication and Assembly jigs and test jigs

8. Electronics

- Subsystems Design
 - Instruments
 - Payload Structure and Connection
 - Power
 - Communications

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- Cabling
- Cooling and heating
- Shielding
- Environmental Concerns
- Reliability and Robustness
- Design and Development Rigor
- Testing
- Fabrication and Assembly jigs and test jigs

9. Software

- Subsystems Design
 - Instruments
 - Power
 - Communications
- Ground Support Equipment (GSE)
- Reliability and Robustness
- Design and Development Rigor
- Testing
- Fabrication and Assembly jigs and test jigs

10. Ground Support

- Ground Support Equipment (GSE)
- Philosophy of Operation
- Subsystems support
 - Instruments
 - Payload Structure and Connection
 - Power
 - Communications
 - Cabling
 - Cooling and heating
 - Shielding
- Environmental Concerns
- Reliability and Robustness
- Design and Development Rigor
- Testing
- Fabrication and Assembly jigs and test jigs

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11. Fabrication and Assembly

- Components and Modules
- Selection, control, and inventory
- Circuit Boards
- Cables and Connectors
- Mechanical Structure
- Clean room requirements

12. Review, testing, and Integration

- Definitions and Philosophy of Order
- Fit Checks
- Functional tests
- Environmental tests
 - Thermal Vacuum
 - Vibration
 - Radiation
- Engineering Models
- Modules and Subsystems
- System Integration and Tests
- Mating Satellite to Booster
- In-Situ monitoring
- Launch monitoring

13. Coordination with Other Organizations

14. Fantastic Failures

15. Problems, Exercises, and Case Studies

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